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NOTICE.

MANY of our readers having in previous years complained of the space occupied for several successive weeks by the Papers read before the British Association, we have, with this number, published, without extra charge, a DOUBLE SUPPLEMENT, containing a full account of the Proceedings of the Association, and of its various Sections, with an abstract of most of the important Papers read during the meeting. Should any Papers not reach us in time for insertion, we shall insert them in our next GAZETTE.

REVIEWS OF NEW BOOKS.

JESUITISM.

Latter Day Pamphlets. By Thomas Carlyle. No. VIII. Chapman and Hall.

THE eighth and concluding Number of this remarkable series is given to what the author entitles Jesuitism, but is of a more rambling and general character than that name would imply. We hardly think it equal in force to its precursors, but still there is much even in its vague and desultory tenor to attract us on our way through the publications of the day. Ignatius Loyola forms the text of the discourse, which the author opens thus:—

"As in the history of human things, which needs above all to abridge itself, it happens usually that the chief actors in great events and great epochs give their name to the series, and are loosely reputed the causers and authors of them; as a German Reformation is called of Luther, and a French Reign of Terror passes for the work of Robespierre, and from the *Iliad* and earlier this has been the wont: so it may be said these current, and now happily moribund, times of ours are worthy to be called, in loose language, the age of Jesuitism,—an epoch whose Palinurus is the wretched mortal known among men as Ignatius Loyola. For some two centuries the genius of mankind has been dominated by the gospel of Ignatius, perhaps the strangest and certainly among the fatallest ever preached hitherto under the sun. Some acquaintance, out of *Bartoli* and others, I have made with that individual, and from old years have studied the workings of him; and to me he seems historically definable, he more than another, as the poison-fountain from which these rivers of bitterness that now submerge the world have flowed."

Soon after, he proceeds, in his own fashion, to remark:—

"Before dismissing busy English readers to their autumnal grouse-shooting,—the *ramadhan*, sacred fast, or month of meditative solitude and devout prayer, now in use among the English,—I have one sad thing to do: lead them a little to the survey of Ignatius and our universal Jesuitism; and ask them, in Heaven's name, if they will answer such a question, What they think of it, and of their share in it? For this is the central and parent phenomenon; the great Tartarean Deep, this, whence all our miseries, fatuities, futilities spring; the accursed Hela's realm, tenanted by foul creatures, ministers of Death Eternal, out of which poor mortals, each for himself, are called to escape if they can! Who is there that can escape; that can become alive to the terrible necessity of escaping?—By way of finish to this offensive and alarming set of Pamphlets, I have still one crowning offence and alarm to try if I can give. The message, namely, That under all those Cannibal Connaughts, distressed needlewomen, and other woes nigh grown intolerable, there lies a still deeper Infinite of wo, and guilt, chargeable on every one of us; and that till this abate, essentially those never will or can."

Mr. Carlyle then descends upon the founder of Jesuitism, and says:—

"Of Ignatius, then, I must take leave to say, there can this be recorded, that probably he has done more mischief in the earth than any man born since. A scandalous mortal, O brethren of mankind who live by truth and not by falsity, I must call this man. Altogether,—here where I stand, looking on millions of poor pious brothers reduced to spiritual mummyhood, who curse me because I try to speak the truth to them, and on a whole world canting and grimacing from birth to death, and finding in their life two serious indubitabilities, Cookery and Scrip,—how, if he is the representative and chief fountain of all this, can I call him other than the superlative of scandals? A bad man, I think; not good by nature; and by destiny swollen into a very Ahriman of badness. Not good by nature, I perceive. A man born greedy; whose greatness in the beginning, and even in the end if we will look well, is indicated chiefly by the depth of his appetite: not the recommendable kind of man! A man full of prurient elements from the first; which at the last, through his long course, have developed themselves over the family of mankind into an expression altogether tremendous.

"A young Spanish soldier and hidalgo with hot Biscayan blood, distinguished, as I understand, by his fierce appetite, chiefly by his audacities and sensualities, and loud unreasonable decision That this Universe, in spite of rumours to the contrary, was a cookery-shop and bordel, wherein garlic, Jamaica pepper, unfortunate females and other spicery and garnishing awaited the bold human appetite, and the rest of it was mere rumour and moonshine: with this life-theory and practice had Ignatius lived some thirty years, a hot human Papin's-digester and little other; when, on the walls of Pampeluna, the destined cannon-shot shattered both his legs,—leaving his head, hitting only his legs, so the destinies would have it,—and he fell at once totally prostrate, a wrecked Papin's-digester; lay many weeks horizontal, and had in that tedious posture to commence a new series of reflections. He began to perceive now that 'the rest of it' was not mere rumour and moonshine; that the rest was, in fact, the whole secret of the matter. That the cookery-shop and bordel was a magical delusion, a sleight-of-hand of Satan, to lead Ignatius down, by garlic and finer temporal spiceries, to eternal Hell;—and that in short he, Ignatius, had lived hitherto as a degraded ferocious Human Pig, one of the most perfect scoundrels; and was, at that date, no other than a blot on creation, and a scandal to mankind."

The vials of the writer's wrath are poured out upon the new course of life adopted by the mutilated man:—

"In fact, Christian doctrine, backed by all the human wisdom I could ever hear of, incline me to think that Ignatius, had he been a good and brave man, should have consented, at this point, to be damned,—as was clear to him that he deserved to be. Here would have been a healing solace to his conscience; one transcendent act of virtue which it still lay with him, the worst of sinners, to do. 'To die forever, as I have deserved; let Eternal 'Justice triumph *so*, by means of me and my foul 'scandals, since otherwise it may not!' *Selbsttödtung*, Annihilation of Self, justly reckoned the beginning of all virtue: here is the highest form of it, still possible to the lowest man. The voice of Nature this, to a repentant out-cast sinner turning again towards the realms of manhood;—and I understand it is the precept of all right Christianity too. But no, Ignatius could not, in his lowest abasement, consent to have justice done on him, not on *him*, ah no;—and there lay his crime and his misfortune, which has brought such penalty on him and us.

"The truth is, it was not of Eternal Nature and her Oracles that Ignatius inquired, poor man; it was of Temporary Art and *hers*, and these sang not of self-annihilation, or Ignatius would not hear that part of their song. Not so did Ignatius read the omens. 'My pruriency being terribly forbidden on one side, let it,' thought Ignatius, deeply unconscious of such a thought, 'have terrible course on another. Garlic-cookery and such-like excitations are accursed to me forever; but cannot I achieve something that shall still assert my *Ego* I in a highly gratifying manner?' Alas, human sincerity, hard as his scourging had been, was not quite attainable by him. In his frantic just agonies, he flung himself before the shrine of Virgin Marys, Saints of the Romish Calendar, three-hatted Holy Fathers, and uncertain Thaumaturgic Entities; praying that he might be healed by miracle, not by course of nature; and that, for one most fatal item, his pruriency of appetite might, under new inverse forms,—continue with him. Which prayer, we may say, was granted. * *

"Ignatius's black militia, armed with this precious message of salvation, have now been campaigning over all the world for about three hundred years; and openly or secretly have done a mighty work over all the world. Who can count what a work! Where you meet a man believing in the salutary nature of falsehoods, or the divine authority of things doubtful, and fancying that to serve the Good Cause he must call the Devil to his aid, there is a follower of Unsaint Ignatius: not till the last of these men has vanished from the earth will our account with Ignatius be quite settled, and his black militia have got their mittimus to chaos again. They have given a new substantive to modern languages. The word 'Jesuitism' now, in all countries, expresses an idea for which there was in Nature no prototype before. Not till these late centuries had the human soul generated that abomination, or needed to name it. Truly they have achieved great things in the world."

The Jesuits have been driven from England:—

"But, alas, (exclaims our author,) the expulsion of the Jesuit Body avails us little, when the Jesuit *Soul* has so nestled itself in the life of mankind everywhere. What we have to complain of is, that all men are become Jesuits! That no man speaks the truth to you or to himself, but that every man lies,—with blasphemous audacity, and does not know that he is lying,—before God and man, in regard to almost all manner of things. This is the fell heritage bequeathed us by Ignatius; to this sad stage has our battle with him come.

"Consider it, good reader;—and yet, alas, if thou be not one of a thousand, what is the use of bidding thee consider it! The deadliest essence of the curse

we now labour under is that the light of our inner eyesight is gone out; that such things are not discernible by considering. 'Cant and even sincere Cant:' O Heaven, when a man doing his sincerest is still but canting! For this is the sad condition of the insincere man: he is doomed all his days to deal with insincerities; to live, move, and have his being, in traditions and conventionalities. If the traditions have grown old, the conventionalities will be mostly false; true in no sense can they be for him: never shall he behold the truth of any matter; formulas, theologic, economic and other, certain superficial readings of truth, required in the market-place, these he will take with him, these he will apply dexterously, and with these he will have to satisfy himself. Sincerity shall not exist for him; he shall think that he has found it, while it is yet far away. The deep, awful and indeed divine quality of truth that lies in every object, and in virtue of which the object exists,—from his poor eyes this is forever hidden. Not with austere divine realities which belong to the Universe and to Eternity, but with paltry ambiguous phantasms, comfortable and uncomfortable, which belong to his own parish and to the current week or generation, shall he pass his days.

"There had been liars in the world; alas, never since the Old Serpent tempted Eve, had the world been free of liars, neither will it be: but there was in this of Jesuit Ignatius an apotheosis of falsity, a kind of subtle quintessence and deadly virus of lying, the like of which had never been seen before."

This is about the pith of the moral expressed in the language of Carlyle, and its farther illustration or application fills the little volume with various readings:—

"The religion of a man in these strange circumstances, what living conviction he has about his Destiny in this Universe, falls into a most strange condition;—and, in truth, I have observed, is apt to take refuge in the stomach mainly. The man goes through his prescribed fugle-motions at church and elsewhere, keeping his conscience and sense of decency at ease thereby; and in some empty part of his brain, if he have fancy left, or brain other than a beaver's, there goes on occasionally some dance of dreamy hypotheses, sentimental echoes, shadows, and other inane make-believes,—which I think are quite the contrary of a possession to him; leading to no clear Faith, or divine life-and-death Certainty of any kind; but to a torpid species of *delirium somnians* and *delirium stertens* rather. In his head or in his heart, this man has of available religion, none. But descend into his stomach, purse and the adjacent regions, you then do awaken, even in the very last extremity, a set of divine beliefs, were it only belief in the multiplication-table, and certain coarser outward forms of *meum* and *tuum*. He believes in the inalienable nature of purchased beef, in the duty of the British citizen to fight for himself when injured, and other similar faiths:—an actual 'religion' of its sort, or revelation of what the Almighty Maker means with him in this Earth, and has irrefragably, as by direct inspiration, charged him to do. This is the man's religion; *this* poor scantling of 'divine convictions' which you find lying, mostly inarticulate, in deep sleep at the bottom of his stomach, and have such difficulty in raising into any kind of elocution or conscious wakefulness.

"Alas, so much of him, his soul almost wholly, is not only asleep there, but gone drowned and dead. The 'religion' you awaken in him is often of a very singular quality; enough to make the observer pause in silence. Such a religion, issuing practically in Hudson Statues, and, alas, also in Distressed Needlewomen, Cannibal Connaughts, and 'remedial measures suited to the occasion,' was never seen among Adam's Posterity before. But it is this modern man's religion; all the religion you will get of him. And if you can winnow out the fugle-motions, fantasies, sentimentalisms, make-believes, and other multitudinous chaff, so that his religion stands before you in its net condition, you may contemplate it with scientific astonishment, with innumerable reflections, and may perhaps draw wise inferences from it.

"A singular piece of scribble, in Sauerteig's hand, bearing marks of haste and almost of rage (for the words, abbreviated to the bone, tumble about as if in battle on the paper), occurs to me at this moment, entitled *Schwein'sche Weltansicht;* and I will try to decipher and translate it.

"'*Pig Philosophy.*—If the inestimable talent of Literature should, in these swift days of progress, be extended to the brute creation, having fairly taken in all the human, so that swine and oxen could communicate to us on paper what they thought of the Universe, there might curious results, not uninstructive to some of us, ensue. Supposing swine (I mean fourfooted swine), of sensibility and superior logical parts, had attained such culture; and could, after survey and reflection, jot down for us their notion of the Universe, and of their interests and duties there,—might it not well interest a discerning public, perhaps in unexpected ways, and give a stimulus to the languishing book-trade? The votes of all creatures, it is understood at present, ought to be had; that you may 'legislate' for them with better insight. 'How can you govern a thing,' say many, 'without first asking its vote?' Unless, indeed, you already chance to know its vote, —and even something more, namely, what you are to think of its vote: what *it* wants by its vote; and, still more important, what Nature wants,—which latter, at the end of the account, is the only thing that will be got!——Pig Propositions, in a rough form, are somewhat as follows:

"'1. The Universe, so far as sane conjecture can go, is an immeasurable Swine's-trough, consisting of solid and liquid, and of other contrasts and kinds;—especially consisting of attainable and unattainable, the latter in immensely greater quantities for most pigs.

"'2. Moral evil is unattainability of Pig's-wash; moral good, attainability of ditto.

"'3. 'What is Paradise, or the State of Innocence?' Paradise, called also State of Innocence, Age of Gold, and other names, *was* (according to Pigs of weak judgment) unlimited attainability of Pig's-wash; perfect fulfilment of one's wishes, so that the Pig's imagination could not outrun reality: a fable and an impossibility, as Pigs of sense now see.

"'4. 'Define the Whole Duty of Pigs.' It is the mission of universal Pighood, and the duty of all Pigs, at all times, to diminish the quantity of unattainable and increase that of attainable. All knowledge and device and effort to be directed thither and thither only; Pig Science, Pig Enthusiasm and Devotion have this one aim. It is the Whole Duty of Pigs.

"'5. Pig Poetry ought to consist of universal recognition of the excellence of Pig's-wash and ground barley, and the felicity of Pigs whose trough is in order, and who have had enough: Hrumph!

"'6. The Pig knows the weather; he ought to look out what kind of weather it will be.

"'7. 'Who made the Pig?' Unknown;—perhaps the Pork-butcher.

"'8. 'Have you Law and Justice in Pigdom?' Pigs of observation have discerned that there is, or was once supposed to be, a thing called justice. Undeniably at least there is a sentiment in Pig-nature called indignation, revenge, &c., which, if one Pig provoke another, comes out in a more or less destructive manner: hence laws are necessary, amazing quantities of laws. For quarrelling is attended with loss of blood, of life, at any rate with frightful effusion of the general stock of Hog's-wash, and ruin (temporary ruin) to large sections of the universal Swine's-trough: wherefore let justice be observed, that so quarrelling be avoided.

"'9. 'What is justice?' Your own share of the general Swine's-trough, not any portion of my share.

"'10. 'But what is 'my' share?' Ah! there in fact lies the grand difficulty; upon which Pig science, meditating this long while, can settle absolutely nothing. My share—hrumph!—my share is, on the whole, whatever I can contrive to get without being hanged or sent to the hulks. For there are gibbets, treadmills, I need not tell you, and rules which Lawyers have prescribed.

"'11. 'Who are Lawyers?' Servants of God, appointed revealers of the oracles of God, who read off to us from day to day what is the eternal Commandment of God in reference to the mutual claims of his creatures in this world.

"'12. 'Where do they find that written?' In Coke upon Lyttleton.

"'13. 'Who made Coke?' Unknown: the maker of Coke's wig is discoverable.—'What became of Coke?' Died.—'And then?' Went to the undertaker; went to the'——But we must pull up: Sauerteig's fierce humour, confounding ever farther in his haste the four-footed with the two-footed animal, rushes into wilder and wilder forms of satirical torch-dancing, and threatens to end in a universal Rape of the Wigs, which in a person of his character looks ominous and dangerous. Here, for example, is his fifty-first 'Proposition,' as he calls it:

"'51. 'What are Bishops?' Overseers of souls.—'What is a soul?' The thing that keeps the body alive.—'How do they oversee that?' They tie on a kind of aprons, publish charges; I believe they pray dreadfully; macerate themselves nearly dead with continual grief that they cannot in the least oversee it.—'And are much honoured?' By the wise very much.

"'52. 'Define the Church.' I had rather not. —'Do you believe in a Future state?' Yes, surely.—'What is it?' Heaven, so-called.—'To everybody?' I understand so; hope so!—'What is it thought to be?' Hrumph!—'No hell, then, at all?'—Hrumph!'"

There is something Rabelaistic in this satire, and with it, as a specimen of the best of the book, we might well close it; but as it is the last of a striking set, we indulge in two or three other morsels of its characteristic contents. The Fine Arts are denounced with uncommon censure, on account of their departure from Truth into the realms of Fiction:—

"As to Jesuitism in the Fine Arts, and how its unsuspected thrice unblessed presence here, too, smites the genius of mankind with paralysis, there were much to be said. Sorrowful reflections lie in that, far beyond what a discerning public fancies in these days; reflections which cannot be entered upon, which can hardly be indicated afar off, at present. Here, too, as elsewhere, the consummate flower of Consecrated Unveracity reigns supreme; and here, as elsewhere, peaceably presides over an enormous Life-in-Death!

"'May the Devil fly away with the Fine Arts!' exclaimed confidentially once, in my hearing, one of our most distinguished public men; a sentiment that often recurs to me. I perceive too well how true it is, in our case. A public man, intent on any real business, does, I suppose, find the Fine Arts rather imaginary. The Fine Arts, wherever they turn up as business, whatever Committee sit upon them, are sure to be the parent of much empty talk, laborious hypocrisy, dilettantism, futility; involving huge trouble and expense and babble, which end in no result, if not in worse than none. The practical man, in his moments of sincerity, feels them to be a pretentious nothingness; a confused superfluity and nuisance, purchased with cost—what he in brief language denominates a *bore*. It is truly so, in these degraded days:—and the Fine Arts, among other fine interests of ours, are really called to recognise it, and see what they will do in it. For they are become the Throne of Hypocrisy, I think the highest of her many thrones, these said Arts; which is very sad to

consider! Nowhere, not even on a gala-day in the Pope's Church of St. Peter, is there such an explosion of intolerable hypocrisy, on the part of poor mankind, as when you admit them into their Royal Picture-gallery, Glyptothek, Museum, or other divine Temple of the Fine Arts. Hypocrisy doubly intolerable; because it is not here, as in St. Peter's and some other churches, an obliged hypocrisy, but a voluntary one. Nothing but your own vanity prompts you here to pretend worshipping; you are not bound to worship, and twaddle pretended raptures, criticisms, and poetic recognitions, unless you like it;—and you do not the least know what a damnable practice it is, or you wouldn't! I make a rule, these many years back, to speak almost nothing, and encourage no speech in Picture-galleries; to avoid company, even that of familiar friends in such situations, and perambulate the place in silence. You can thus worship or not worship, precisely as the gods bid you; and are at least under no obligation to do hypocrisies, if you cannot conveniently worship.

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"After all, I do not blame the poor Fine Arts for taking into fiction, and into all the deeper kinds of falsity which grow from that. Ignatius, and a world too ready to follow him, had discovered the divine virtues of *fiction* in far higher provinces; the road to fiction lay wide open for all things! But Nature's eternal voice, inaudible at present, or faintly audible, proclaims the contrary, nevertheless; and will make it known again one day. Fiction, I think, or idle falsity of any kind, was never tolerable, except in a world which did itself abound in practical lies and solemn shams; and which had gradually impressed on its inhabitants the inane form of character tolerant of that kind of ware. A serious soul, can it wish, even in hours of relaxation, that you should fiddle empty nonsense to it? A serious soul would desire to be entertained, either with absolute silence, or with what was truth, and had fruit in it, and was made by the Maker of us all. With the idle soul I can fancy it far otherwise; but only with the idle.

"Given an idle potentate, monster of opulence, gluttonous bloated Nawaub, of black colour or of white,—naturally he will have prating story-tellers to amuse his half-sleepy hours of rumination; if from his deep gross stomach, sinking overloaded as if towards its last torpor, they can elicit any transient glow of interest, tragic or comic, especially any wrinkle of momentary laughter, however idle, great shall be their reward. Wits, story-tellers, ballad-singers, especially dancing-girls who understand their trade, are in much request with such gluttonous, half-sleeping, black or white Monster of Opulence. A bevy of supple dancing-girls who, with the due mixture (mixture settled by custom), and with not more than the due mixture of lascivious fire, will represent to him, brandishing their daggers, and rhythmically chanting and posturing, the Loves of Vishnu, Loves of Adonis, Death of Psyche, Barber of Seville, or whatever nonsense there may be, according to time or country: these are the kind of artists fit for such unfortunate stuffed, stupified Nawaub, in his hours of rumination; upon these his hot, heavy-laden eye may rest without abhorrence; if with perceptible momentary satisfaction emerging from his bottomless ennui,—then victory and gold-purses to the artist; be such artist crowned with laurel or with parsley, and declared divine in presence of all men.

"Luxurious Europe, in its reading publics, dilettanti, cognoscenti, and other publics, is wholly one big ugly Nawaub of that kind; who has converted all the Fine Arts into after-dinner amusements; slave adjuncts to his cookeries, upholsteries, tailories, and other palpably Coarse Arts. The brutish monster has turned all the Nine Muses, who by birth are sacred Priestesses of Heaven, into scandalous Bayaderes; and they dance with supple motions, to enlighten the vile darkness of his ennui for him. Too truly *mad*, these poor Fine Arts! The Coarse Arts, too, if he had not an authentic stomach and skin, which always bring him a little right again in those departments, would go mad.

"How all things hang together! Universal Jesuitism having once lodged itself in the heart, you will see it in the very finger-nails by and by. Calculate how far it is from Sophocles and Æschylus to Knowles and Scribe; how Homer has gradually changed into Sir Harris Nicholas; or what roads the human species must have travelled before a *Psalm of David* could become an *Opera at the Haymarket*, and men, with their divine gift of Music, instead of solemnly celebrating the highest fact, or 'singing to the praise of God,' consented to celebrate the lowest nonsense, and sing to the praise of Jenny Lind and the Gazza Ladra,—perhaps the step from Oliver Cromwall to Lord John Russell will not seem so unconscionable! I find it within, and not without, the order of Nature; and that all things, like all men, are blood-relations to one another.

"This accursed nightmare, which we name Jesuitism, will have to vanish; our comfort is, that life itself is not much longer possible otherwise.

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"My enlightened friends of this present supreme age, what shall I say to you? That Time does rest on Eternity; that he who has no vision of Eternity will never get a true hold of Time, or its affairs. Time is so constructed; that is the *fact* of the construction of this world. And no class of mortals who have not,—through Nazareth or otherwise,—come to get heartily acquainted with such fact, perpetually familiar with it in all the outs and ins of their existence, have ever found this Universe habitable long. Alas, no; their fraternities, equalities, free-trade philosophies, greatest-happiness principles, soon came to a conclusion; and the poor creatures had to go,—to the Devil, I fear! Generations such as ours play a curious part in World-History.

"They sit as Apes do round a fire in the woods, but know not how to feed it with fresh sticks. They have to quit it soon, and march—into Chaos, as I conjecture; into that land of which Bedlam is the Mount Zion. The world turns out *not* to be made of mere eatables and drinkables, of newspaper puffs, gilt carriages, conspicuous flunkeys; no, but of something other than these! Old Suetonius Romans, corrupt babbling Greeks of the Lower Empire, examples more than one: consider them; be taught by them, add not to the number of them. Heroism, not the apery and traditions of Heroism; the feeling, spoken or silent, that in man's life there did lie a Godlike, and that his Time-history was verily but an emblem of some Eternal: without this there had been no Rome either; it was this that had made old Rome, old Greece, and old India. Apes, with their wretched blinking eyes, squatted round a fire which they cannot feed with new wood; which they say will last for ever without new wood,—or, alas, which they say is going out for ever: it is a sad sight! * * *

"It is a true adage, 'As the fool thinks, the bell clinks.' 'This mad Universe,' says Novalis, 'is the waste picture of your own dream.' Be noble of mind, all Nature gives response to your heroic struggle for recognition by her; with her awful eternal voices, answers to every mind, 'Yea, I am divine; be thou.' From the cloud-whirlwind speaks a God yet, my friend, to every man who has a human soul. To the inhuman brute-soul, indeed, she answers, 'Yea, I am brutal; a big cattle-stall, rag-fair and St. Katherine's wharf: enter thou, and fat victual, if thou be faithful, shall not fail.'

"Not because Heaven existed, did men know Good from Evil; the 'because,' I invite you to consider, lay quite the other way. It was *because* men, having hearts as well as stomachs, felt there, and knew through all their being, the difference between Good and Evil, that Heaven and Hell first came to exist. That is the sequence; that and not the contrary. If you have now no Heaven to look to; if you now sprawl, lamed and lost, sunk to the chin in the pathless sloughs of this lower world without guidance from above, know that the fault is not Heaven's at all; but your own! Our poor friends 'the Apes by the Dead Sea' have now no Heaven either; they look into this Universe now, and find it tragically grown to *be* the Humbug they insisted on its being. Moses went his ways, and this enchantment fell upon them! Such 'enchantments' rhadamanthine Nature does yet daily execute on the rebellious; he that has eyes may still daily see them,—fearful and wonderful ever as of old.

"Surely," concludes our leader in this instance,—

"Surely, surely this ignoble sluggishness, sceptical torpor, indifference to all that does not bear on Mammon and his interests, is not the natural state of human creatures; and is not doomed to be their final one! Other states once were, or there had never been a Society, or any noble thing, among us at all. Under this brutal stagnancy, there lies painfully imprisoned some tendency which could become heroic.

"The restless gnawing ennui which, like a dark dim ocean-flood, communicating with the Phlegethons and Stygian deeps, begirdles every human life so guided,—is it not the painful cry even of that imprisoned heroism? Imprisoned it will never rest; set forth at present, on these sad terms, it cannot be. You unfortunates, what is the use of your moneybags, of your territories, funded properties, your mountains of possessions, equipments and mechanic inventions, which the flunkey pauses over, awe-struck, and almost rises into epos and prophecy at sight of? No use, or less than none. Your skin is covered, and your digestive and other bodily apparatus is supplied; and you have but to wish in these respects, and more is ready; and—the Devils, I think, are quizzing you. You ask for 'happiness,'—'O give me happiness!'—and they hand you ever new varieties of covering for the skin, ever new kinds of supply for the digestive apparatus, new and ever new, worse or not a whit better than the old; and—and—this is your 'happiness?' As if you were sick children; as if you were not men, but a kind of apes!

"I rather say, be thankful for your ennui; it is your last mark of manhood; this at least is a perpetual admonition, and true sermon preached to you. From the chair of verity this, whatever chairs be chairs of *cant*ity. Happiness is *not* come, not like to come; ennui, with its great waste ocean-voice, moans answer, Never, never. That ocean-voice, I tell you, is a great fact, it comes from Phlegethon and the gates of the Abyss; its bodeful never-resting inexorable moan is the voice of primeval Fate, and of the eternal necessity of things. Will you shake away your nightmare and arise; or must you lie writhing under it, till death relieve you? Unfortunate creatures! You are fed, clothed, lodged as men never were before; every day in new variety of magnificence are you equipped and attended to; such wealth of material means as is now yours was never dreamed of by man before:—and to do any noble thing, with all this mountain of implements, is for ever denied you. Only ignoble, expensive and unfruitful things can you now do; nobleness has vanished from the sphere where you live. The way of it is lost, lost; the possibility of it has become incredible. We must try to do without it, I am told.—Well; rejoice in your upholsteries and cookeries then, if so be they will make you 'happy.' Let the varieties of them be continual and innumerable. In all things let perpetual change, if that is a perpetual blessing to you, be your portion instead of mine; incur that Prophet's curse, and in all things in this sublunary world 'make yourselves like unto a wheel.' Mount into your railways; whirl from place to place, at the rate of fifty, or if you like of five hundred miles an hour: you cannot escape

rom that inexorable all-encircling ocean-moan of ennui. No: if you would mount to the stars, and do yacht-voyages under the belts of Jupiter, or stalk deer on the ring of Saturn, it would still be girdle you. You cannot escape from it, you can but change your place in it, without solacement except one moment's. That prophetic Sermon from the Deeps will continue with you, till you wisely interpret it and do it, or else till the Crack of Doom swallow it and you. *Adieu: Au revoir.*"

A more perfect sample of Carlylism could not be chosen wherewith to bid our farewell to this (when collected together) extraordinary work. That it is liable to objections, like all other literary performances, there can be no doubt; but, to our judgment, it has been very unfairly, not to say superficially and ignorantly attacked, by those who have not felt the strength of many of its arguments, nor the value of their applicability to the greatest concerns of mankind.

BOTANICAL PERIODICAL.

Hooker's Journal of Botany, and Kew Garden Miscellany. Parts I. to XX. Reeve and Benham.

THE first title of this work is scarcely a correct indication of its contents. It is true that the journal from which it sprang was devoted to very dry and learned papers on botany; but the present issue has undergone an important change: firstly, in being composed of more generally interesting and readable matter, with now and then some acceptable colouring in the plates; and, secondly, in being reduced to the convenient price of a shilling. Frequent attempts have been made to establish periodical journals in particular departments of natural history, but they have mostly proved fruitless. The success of Sir W. J. Hooker's *Journal of Botany* has resulted mainly from the zealous efforts of the editor, the Director of the Royal Gardens of Kew, to afford a popular means of recording the discovery of remarkable plants, to communicate intelligence and observations of travellers abroad on botanical expeditions, and to illustrate the nature of vegetable substances in familiar use, with the origin of which few are acquainted. Many of the productions used in the arts and manufactures, which constitute in their different stages of growth so interesting a feature in the Kew Museum, are here described; and the gigantic palm-house, from whose winding staircase the spectator may look down upon a marvellous intertropical region of tree-ferns and palms, furnishes also an occasional subject of interest.

Few are perhaps aware that the well-known cocoa-palm yields excellent toddy, as well as milky nuts, as agreeable to the taste and much more readily digested:—

"*Toddy*, or *Palm-wine*, is extracted from several kinds of palms, perhaps from none more extensively than from the common cocoa-nut, *Cocos nucifera*, which, after having been transplanted, begins to bear in from thirteen to sixteen years. It continues in full vigour for forty years, and lives for about thirty years more, but is then constantly on the decline. When the trees show flower for the first time, a trial is made by cutting a young flowering branch, to ascertain whether it be fit for producing Palm-wine. If the incision bleeds, it is fit for the latter purpose, and is more valuable than a tree whose flower-branch, when cut, continues dry, and is fit only for producing nuts. The palms fit for wine are then let to the *Tiars*, or *Shaners*, who extract the juice and boil it down to *Jaggary*, or distil it to extract Arrack. In a good soil the trees yield juice all the year, but on a poor soil they are exhausted in six months. A clever workman can manage thirty or forty trees, and pays annually for each from one to one and a half *fanam*. When the spadix, or flowering-branch, is half shot, and the *spatha*, or covering of the flowers, is not yet opened, the *Tiar* cuts off its point, binds the stump round with a leaf, and beats the remaining part of the spadix with a small stick. For fifteen days this operation is repeated, a thin slice being daily removed. The stump then begins to bleed, and a pot is fixed under it to receive the juice, or *Callu*, which the English call *Toddy*."

The narrative of Dr. Hooker's botanical mission among the lofty mountains of the Himalaya range, derived from his letters home, and which is given from time to time in this Journal, is full of valuable interest, and not alone botanical. He appears to have had little hesitation in crossing the Thibetan frontier, although, as already known, he fell into the hands of the Sikkim Rajah. His brief captivity, however, obtained for us some advantage in the shape of territory, in satisfaction of the insult offered to our enterprising countryman:

"On the opposite bank we were delayed some hours, waiting for a guide, whom we expected to follow us. Four roads meet here, or rather forest-paths, and all are difficult to find. Being now in Sikkim, and beyond the British ground, any one guiding Europeans is liable to punishment; and though the wood we sought is so unfrequented that there is no chance of obstruction, the others, which might be inadvertently taken, are more populous. Ours, of course, lay down the river, whose banks were far too rugged, here, to be pursued. A marriage procession soon came up, or rather the bridegroom half of the party, a handsome young Lepcha, leading a cow for the marriage feast. After talking to him a little, he volunteered to show us the path, which led through a thick forest, along the steep hill side; it soon descended to a narrow belt of dense jungle, with a weak *Equisetum*, five feet high, climbing among rank *Grasses*, small *Palms*, &c.

"The contrast of the tropical *Cycas* and Scotch looking *Pine* was most wonderful. Much of the forest had been burnt, and we traversed great blackened patches where the heat was terrific, and increased by the prostrate and still burning trunks of great trees, which smoulder for months, and leave a heap of white ashes. The large timber, being hollow in the centre, a current of air is produced that eats away all the circumference, the sides fall over the burning centre, and all is consumed. You are often startled when walking in the forest, by the hot blast proceeding from such trunks, which are approached without suspicion of their being other than cold dead trunks.

"Leaving the forest, the path runs along the river bank, and over the great masses of rock which show its course. Skipping from stone to stone in these close valleys, carrying an umbrella and stick, is very toilsome work. There is much mica in the sand between the rocks, and much of the sand is red—disintegrated jasper, probably, or quartz tinged with oxide of iron, exactly similar to what I met with on the banks of the Ganges."

The great interest which attaches at this moment to the royal water lily, *Victoria regia*, from the circumstance of its having been successfully transplanted to the waters of Chatsworth, Syon, and Kew, renders the following account of its re-discovery in the Amazon river by Mr. Spruce an acceptable conclusion to our notice:—

"The crew of our vessel consisted almost entirely of Tapuya Indians, with whom I had frequent conversations respecting the plants of the environs of Santarem. Amongst others, they told me of a wonderful water-plant, called, in *lengua geral*, 'Oapé,' but in Portuguese, 'Furno,' from its leaf resembling in shape and size the mandiocca-*furnaces* of this country. They added, that the leaf was purple on the underside, where it was also furnished with numerous spines. This description could refer to no other plant than the *Victoria*, and I was confirmed in this conclusion by further testimony when I arrived at Santarem. Here nearly everybody had seen the 'Furno,' and some wondered I should inquire so eagerly about a plant which they had known for the last forty years, and never dreamed to be anything rare. Our countryman, Captain Hislop, one of the oldest settlers at Santarem, had, however, ascertained the plant to be the *Victoria*, from an account of Schomburgk's discovery of it in Guiana, which he had seen in some review. As soon as I conveniently could, I planned an excursion to one of the stations, a lake in the Ilha Grande de Santarem, the largest island of the archipelago, formed by the junction of the Amazon and Tapajoz. * * * * * Following this advice, we at length reached the *ingarapé*, and were at once gratified by seeing the *Victoria* growing by the *ingarapé* itself. We lost no time in crossing to the other side, where I sent a man to the outer edge of the mass of plants, while Mr. King and I waded into the water to cut the leaves and flowers, which he towed round to the landing place. We were warned by the people not to go amongst the plants, as their prickles were venomous; but I got both hands and feet considerably pricked without experiencing any ill effects. We were fortunate in finding the plant in good flower, but, according to the testimony of all at Santarem who had seen it, the leaves attain their greatest dimensions in the winter. Captain Hislop assures me he has seen many leaves twelve feet in diameter; whereas the largest we saw measured a very little above four feet across, and they were packed as close as they could lie.

The aspect of the *Victoria*, in its native waters, is so new and extraordinary, that I am at a loss to what to compare it. The image is not a very poetical one, but assuredly the impression the plant gave me, when viewed from the bank above, was that of a number of tea trays floating, with here and there a bouquet protruding between them; but when more closely viewed, the leaves excited the greatest admiration from their immensity and perfect symmetry. A leaf turned up, suggests some strange fabric of cast iron, just taken out of the furnace; its colour, and the enormous ribs with which it is strengthened, increasing the similarity."

To all who are interested in the natural history of plants and their uses, and in the progress of botanical researches in foreign parts, we cordially recommend this valuable monthly current of intelligence. To impart scientific knowledge in language that he who runs may read, and be impressed with its simplicity, is among the improvements of our age.

RURAL WALKS AND IMAGES.

Rural Hours. By Miss Cooper. 2 vols. Bentley.

IT is a lucky thing for us that there are some books which review themselves, and luckier still that, at this busy scientific season, this is one of them. Open where you please, you find the same pleasant and natural variety. The notes are rural, and a feeling for the delights of the country the quality of the fair author. Let us therefore walk into the fields with her, and stop anywhere for the pleasures of observation and a tête-à-tête:—

"Passed the afternoon in the woods. What a noble gift to man are the forests! What a debt

of gratitude and admiration we owe for their utility and their beauty!

"How pleasantly the shadows of the wood fall upon our heads, when we turn from the glitter and turmoil of the world of man! The winds of heaven seem to linger amid these balmy branches, and the sunshine falls like a blessing upon the green leaves; the wild breath of the forest, fragrant with bark and berry, fans the brow with grateful freshness; and the beautiful wood-light, neither garish nor gloomy, full of calm and peaceful influences, sheds repose over the spirit. The view is limited, and the objects about us are uniform in character; yet within the bosom of the woods the mind readily lays aside its daily littleness, and opens to higher thoughts in silent consciousness that it stands alone with the works of God. The humble moss beneath our feet, the sweet flowers, the varied shrubs, the great trees, and the sky gleaming above in sacred blue, are each the handiwork of God. They were all called into being by the will of the Creator, as we now behold them, full of wisdom and goodness.

"Every object here has a deeper merit than our wonder can fathom; each has a beauty beyond our full perception; the dullest insect crawling about these roots lives by the power of the Almighty; and the discoloured shreds of last year's leaves wither away upon the lowly herbs in a blessing of fertility. But it is the great trees, stretching their arms above us in a thousand forms of grace and strength, it is more especially the trees which fill the mind with wonder and praise.

"Of the infinite variety of fruits which spring from the bosom of the earth, the trees of the wood are the greatest in dignity. Of all the works of the creation which know the changes of life and death, the trees of the forest have the longest existence. Of all the objects which crown the grey earth, the woods preserve unchanged, throughout the greatest reach of time, their native character: the works of man are ever varying their aspect; his towns and his fields alike reflect the unstable opinions, the fickle wills and fancies of each passing generation; but the forests on his borders remain to-day the same they were ages of years since. Old as the everlasting hills, during thousands of seasons they have put forth, and laid down their verdure in calm obedience to the decree which first bade them cover the ruins of the Deluge.

"But, although the forests are great and old, yet the ancient trees within their bounds must each bend individually beneath the doom of every earthly existence; they have their allotted period when the mosses of Time gather upon their branches —when, touched by decay, they break and crumble to dust. Like man, they are decked in living beauty; like man, they fall a prey to death; and while we admire their duration, so far beyond our own brief years, we also acknowledge that especial interest which can only belong to the graces of life and to the desolation of death. We raise our eyes and we see collected in one company vigorous trunks, the oak, the ash, the pine, firm in the strength of maturity; by their side stand a young group, elm, and birch, and maple, their supple branches playing in the breezes, gay and fresh as youth itself; and yonder, rising in unheeded gloom, we behold a skeleton trunk, an old spruce, every branch broken, every leaf fallen,—dull, still, sad, like the finger of Death.

"It is the peculiar nature of the forest, that life and death may ever be found within its bounds, in immediate presence of each other; both with ceaseless, noiseless, advances, aiming at the mastery; and if the influences of the first be the most general, those of the last are the most striking. Spring, with all her wealth of life and joy, finds within the forest many a tree unconscious of her approach; a thousand young plants springing up about the fallen trunk, the shaggy roots, seek to soften the gloomy wreck with a semblance of the verdure it bore of old; but ere they have thrown their fresh and graceful wreaths over the mouldering wood, half their own tribe wither and die with the year."

This is sweet moralizing, for Miss Cooper partakes of the nature of the melancholy Jaques, and finds sermons in stones, and books in the babbling brooks. Her remarks on objects of natural history are also among the beauties of these volumes:—

"There are certain fancies connected with the wheat-fields prevailing among our farmers, which they are very loth to give up. There is the old notion, for instance, that a single barberry bush will blight acres of wheat, when growing near the grain, an opinion which is now, I believe, quite abandoned by persons of the best judgment. And yet you see frequent allusions to it, and occasionally some one brings up an instance which he sagely considers as unanswerable proof that the poor barberry is guilty of this crime. In this county we have no barberries; they are a naturalized shrub in America; at least, the variety now so common in many parts of the country came originally from the other hemisphere, and they have not yet reached us. There is another kind, a native, abundant in Virginia; whether this is also accused of blighting the wheat, I do not know.

"The deceitful chess, or cheat, is another object of special aversion to the farmers, and very justly. It is not only a troublesome weed among a valuable crop, but, looking so much like the grain, its deceptive appearance is an especial aggravation. Many of our country folk, moreover, maintain that this plant is nothing but a sort of wicked, degenerate wheat; they hold that a change comes over the grain, by which it loses all its virtue, and takes another form, becoming, in short, the worthless chess. This opinion some of them maintain stoutly against all opponents, at the point of scythe and pitchfork. And yet this odd notion is wholly opposed to all the positive laws, the noble order of nature; they might as well expect their raspberry bushes to turn capriciously into blackberries, their potatoes into beets, and lettuce into radishes.

"Most of the weeds which infest our wheat-fields come from the Old World. This deceitful chess, the corn-cockle, the Canada thistle, tares, the voracious red-root, theblue-weed, or bugloss, with others of the same kind. There is, however, one brilliant but noxious plant found among the corn-fields of Europe which is not seen in our own, and that is the gaudy red poppy. Our farmers are no doubt very well pleased to dispense with it; they are quite satisfied with the weeds already naturalized.

"But so common is the poppy in the Old World that it is found everywhere in the corn-fields, along the luxuriant shores of the Mediterranean, upon the open, chequered plains of France and Germany, and among the hedged fields of England. The first wild poppies ever seen by the writer were gathered by a party of American children about the ruins of Netley Abbey, near Southampton, in England.

"So common is this brilliant weed among the European grain-fields, that there is a little insect, an ingenious, industrious, little creature, who invariably employs it in building her cell. This wild bee, called the upholsterer bee, from its habits, leads a solitary life, but she takes a vast deal of pains in behalf of her young. About the time when the wild poppy begins to blossom, this little insect flies into a corn-field, looks out for a dry spot of ground, usually near some pathway; here she bores a hole about three inches in depth, the lower portion being wider than the mouth; and quite a toil it must be to so small a creature to make the excavation: it is very much as if a man were to clear out the cellars for a large house with his hands only.

"But this is only the beginning of her task; when the cell is completed, she then flies away to the nearest poppy, which, as she very well knows, cannot be very far off in a corn-field; she cuts out a bit of the scarlet flower, carries it to the nest, and spreads it on the floor like a carpet; again she returns to the blossom and brings home another piece, which she lays over the first. When the floor is covered with several layers of this soft scarlet carpeting, she proceeds to line the sides throughout in the same way, until the whole is well surrounded with these handsome hangings.

"This brilliant cradle she makes for one little bee, laying only a single egg amid the flower-leaves. Honey and bee-bread are then collected and piled up to the height of an inch; and when this store is completed, the scarlet curtains are drawn close over the whole, and the cell is closed, the careful mother replacing the earth as neatly as possible, so that after she has finally smoothed the spot over, it is difficult to discover a cell you may have seen open the day before.

"This constant association with the wheat, which even the insects have learned by instinct, has not remained unheeded by man. Owing to this connection with the precious grain, the poppy of the Old World received, ages ago, all the honours of a classical flower, and became blended with the fables of ancient mythology. Not only was it given to the impersonation of sleep, as one of his emblems, from the well-known narcotic influences of the plant, but it was also considered as sacred to one of the most ancient and most important deities of the system—the very oldest statues of Ceres represent her with poppies in her garlands, blended with ears of wheat, either carried in her hand, or worn on her head. The ancient poets mingled the ears of wheat and the poppy in their verses—

> 'The meanest cottager
> *His poppy grows among the corn.*'

says Cowley, in his translation of Virgil; and in our own day Mr. Hood, in his pleasing picture of Ruth, introduces both plants, when describing her beautiful colour:

> 'And on her cheek an autumn flush,
> *Like poppies grown with corn.*'

In short, so well established is this association of the poppy and wheat, by the long course of observation from time immemorial to the present season, that the very *modistes* of Paris, when they wish to trim a straw bonnet with field plants, are careful to mingle the poppy with heads of wheat in their artificial flowers. Fickle fashion herself is content to leave these plants, year after year, entwined together in her wreaths.

"But in spite of this general prevalence of the poppy throughout the grain-fields of the Old World, and its acknowledged claim to a place beside the wheat, it is quite unknown here as a weed. With us this ancient association is broken up. Never having seen it ourselves, we have frequently asked farmers from different parts of the country if they had ever found it among their wheat, and thus far the answer has always been the same; they had never seen the flower out of gardens. Among our cottage gardens it is very common. It is, however, naturalized about Westchester, in Pensylvania, and may possibly be found in some other isolated spots; but in all this range of wheat-growing country, among the great grain-fields of the Genesee, of Ohio, of Michigan, it is said to be entirely unknown as a field plant.

"It must be the comparative severity of the winters which has broken up this very ancient connection in our part of the world; and yet they have at times very severe seasons in France and Germany, without destroying the field poppies."

The difference between the Old World and the New is a striking characteristic of these rambles. Here is another example,—

"Few people like spiders. No doubt these insects must have their merits and their uses, since none of God's creatures are made in vain; all living things are endowed with instincts more or less admirable; but the spider's plotting, creeping ways, and a sort of wicked expression about him,

lead one to dislike him as a near neighbour. In a battle between a spider and a fly, one always sides with the fly; and yet of the two, the last is certainly the most troublesome insect to man. But the fly is frank and free in all his doings: he seeks his food openly, and he pursues his pastimes openly; suspicions of others, or covert designs against them are quite unknown to him, and there is something almost confiding in the way in which he sails around you, when a single stroke of your hand might destroy him.

"The spider, on the contrary, lives by snares and plots; he is, at the same time, very designing and very suspicious, both cowardly and fierce; he always moves stealthily, as though among enemies, retreating before the least appearance of danger, solitary and morose, holding no communion with his fellows. His whole appearance corresponds with his character, and it is not surprising, therefore, that while the fly is more mischievous to us than the spider, we yet look upon the first with more favour than the last; for it is a natural impulse of the human heart to prefer that which is open and confiding, to that which is wily and suspicious, even in the brute creation. The cunning and designing man himself will, at times, find a feeling of respect and regard for the guileless and generous stealing over him, his heart, as it were, giving the lie to his life. Some two or three centuries since, when people came to this continent from the Old World in search of gold, oddly enough, it was considered a good sign of success when they met with spiders! It would be difficult to say why they cherished this fancy; but according to that old worthy, Hakluyt, when Martin Frobisher and his party landed on Cumberland Island, in quest of gold, their expectations were much increased by finding there numbers of spiders, 'which, as many affirm, are signes of great store of gold.'

"They fancied that springs also were abundant near minerals, so that we may, in this county, cherish great hopes of a mine—if we choose."

Another specimen takes us away from natural history to common humanity:—

"Church-yards are much less common in this country than one might suppose, and to judge from the turn things are taking now, it seems probable this pious, simple custom of burying about our churches, will soon become obsolete. As it is, the good people of many rural neighbourhoods must make a day's journey before they can find a country church-yard in which to read Gray's Elegy. A great proportion of the places of worship one sees here have no graves near them. In the villages they make part of the crowd of buildings with little space about them; nor does it follow that in the open country, where land is cheaper, the case is altered; you pass meeting-houses standing apart, with broad fields spreading on all sides, but no graves at hand. Some distance beyond, perhaps, you will come to a square enclosure, opening into the highway, and this is the cemetery of the congregation. Small family burying-grounds, about the fields, are very common; sometimes it is a retired spot, neatly enclosed, or it may be only a row of graves in one corner of the meadow, or orchard.

"Walking in the fields a while since, we were obliged to climb a stone wall, and on jumping down into the adjoining meadow, we found we had alighted on a grave; there were several others lying around near the fence, an unhewn stone at the head and foot of each humble hillock. This custom of burying on the farms had its origin, no doubt, in the peculiar circumstances of the early population, thinly scattered over a wide country, and separated by distance and bad roads from any place of public worship.

"In this way the custom of making the graves of a family upon the homestead gradually found favour among the people, and they learned to look upon it as a melancholy gratification to make the tombs of the departed members of a family near the dwelling of the living. The increase of the population, and the improvement of the roads on one hand, with the changes of property, and the greater number of villages on the other, are now bringing about another state of things. Public cemeteries for parishes, or whole communities, are becoming common, while the isolated burial-places about the farms are more rare than they used to be.

"The few church-yards found among us are usually seen in the older parishes; places of worship, recently built, very rarely have a yard attached to them. The narrow, crowded, abandoned church-yards, still seen in the heart of our older towns, have become, in the course of time, very striking monuments to the dead."

From the quiet of death, we pass to the bustle of life and an American cattle show:—

"The country fair of the Agricultural Society is now going on in the village, which is thronged with waggons and chilly-looking people. Three or four thousand persons, men, women, and children, sometimes attend these fairs; to-day, the village is thought more crowded than it has been any time this year; neither the circus, nor menagerie, nor election, has collected so many people as the Fair.

"The cattle-show is said to be respectable; the ploughing match and speech were also pronounced creditable to the occasion. Within doors there is the usual exhibition of farm produce and manufactures. The first department consists of butter, cheese, maple sugar, honey, a noble pumpkin, about five feet in circumference; some very fine potatoes, of the Carter and pink-eye varieties, looking as though there were no potato-disease in the world; some carrots and turnips also. Apples were the only fruit exhibited. Some of the butter and cheese was pronounced very good; and both the maple sugar and honey were excellent. Altogether, however, this part of the show was meagre; assuredly we might do much more than has yet been done in this county, with our vegetables and fruits. And a little more attention to the arrangement of the few objects of this kind exhibited at the Fair, is desirable; people take great pains in arranging a room for a public ball or dinner; but an exhibition of this kind is of far more real interest and importance than any meeting for mere amusement. These agricultural fairs are among the most pleasing as well as most important gatherings we country people know of.

"The cattle and the domestic manufactures form much the most important features in our fairs. The stock of this county is not thought remarkable, I believe, either one way or the other; but some prizes from the State Society have been distributed among us. Our domestic manufactures, however, are really very interesting, and highly creditable to the housewives of the county. Some of the flannels and carpeting are of excellent quality. A very short time since, before imported carpets were reduced as low in price as they are to-day, a large amount of carpeting was made by families in the inland counties, and some of the best houses were carpeted throughout with domestic manufactures, the wool being raised on the farm, and spun, dyed, and woven in the house, or in the immediate neighbourhood. At this moment many such carpets are found in our county, and are probably thought imported by those who are not aware how much work of the kind is done among our rural population. Some are made on the Venetian patterns, like stair carpeting, but others are imitation of ingrain.

"There is still another kind of carpeting, more humble in quality, much used in the country—rag carpeting—some of which may be seen in every farm-house, and common in the villages also; strips of cotton, woollen, or linen are cut, sewed together, and dyed of different colours, when they are woven with a warp of tow, in Venetian patterns. Some of these are very pretty and neat. One of the best and largest country inns in the interior of this State is almost wholly carpeted in this way. In Europe these rag carpets are not seen, at least not on the common track of travellers, and possibly they are an invention of our great grandmothers after they had crossed the ocean. Or it may be that they are found in English farm-houses off the common route.

"Besides excellent flannels and carpeting, we saw very good shawls, stamped table-covers, blankets, shirting and sheeting, towelling and table linen; leather and morocco; woollen stockings, mittens, gloves, and socks; very neat shoes and boots, on Paris patterns; embroidery, and fancy work of several kinds; some very good broadcloth; pretty plaid and striped woollen materials, for dresses; handsome bed-quilts, of unusually pretty patterns, and well quilted, &c. &c. Altogether, this was the most creditable part of the in-door exhibition. Every one must feel an interest in these fairs; and it is to be hoped they will become more and more a source of improvement and advantage in everything connected with farming, gardening, dairy-work, manufacturing, mechanical, and household labours.

"The butter and cheese of this county ought to be of the very highest quality. That of our best dairies already commands a high price in the large towns; but with plenty of grass, good spring water in abundance, and a comparatively cool summer climate, there ought not to be a pound of *bad butter* found here. Unfortunately, a great deal of a very indifferent kind is made and eaten; and yet bad butter is almost as injurious to health as bad air, of which we hear so much now-a-days. At the taverns it is seldom that one meets with tolerable butter."

In winter, we have the picture of a "very fine day:"—

"A very fine day; quite a full market-day in the village; many people coming in from the country.

"The word store has been declared an Americanism, but it is not always easy to decide what words and terms have actually been coined on this side the Atlantic, so many of those which pass for Yankeeisms being found in the best English writers, like the *stage* of Sterne, and the *pretty considerable* of Burke, for instance. Many other words and phrases of this disputed nature were undeniably brought over by the original colonists, and have been merely preserved by their descendants, while our English kinsmen have forgotten them. It is quite possible that the word 'store' was first brought into common use when there was but one store-house in every new colony, and all the different wants of the little community were supplied from the same establishment.

"Although circumstances have so much changed since those days, although the catalogue of necessaries and luxuries has been so much increased, yet the country store still preserves much of this character, and would seem to deserve a name of its own. It is neither a shop devoted to one limited branch of trade, nor a warehouse implying the same branch carried out on a greater scale, nor is it a bazaar where many different owners offer goods of various kinds within the same walls. The store, in fact, has taken its peculiar character, as well as its name, from the condition of the country; and the word itself, in this application of it, might bear a much better defence than many others which have found their way into books.

"Now-a-days there are always, however, more than one store in every village. Indeed, you never find one of a trade standing long alone anywhere on Yankee ground. There is no such man in the country as *the* village doctor, *the* baker, *the* lawyer, *the* tailor; they must all be marshalled in the plural number. We can understand that one doctor should need another to consult and disagree with; and that one lawyer requires another with whom he may join issue in the case of Richard Roe v.

John Doe, but why there should always be two barbers in an American village, does not seem so clear, since the cut of the whiskers is an arbitrary matter in our day, whatever may be the uncertainties of science and law. Many trades, however, are carried on by threes and fours; it strikes one as odd that in a little town of some 1400 souls, there should be three jewellers and watchmakers. There are also some score of *tailoresses*—and both trade and word, in their feminine application, are said to be thoroughly American.

"Then, again, there are seven taverns in our village, four of them on quite a large scale. As for the eating-houses—independently of the taverns—their number is quite humiliating; it looks as though we must needs be a very gormandizing people: there are some dozen of them—Lunches, Recesses, Restaurants, &c. &c., or whatever else they may be called, and yet this little place is quite out of the world, off the great routes. It is, however, the county town, and the courts bring people here every few weeks.

"But to return to the 'store:' there are half a dozen of these on quite a large scale. It is amusing to note the variety within their walls. Barrels, ploughs, stoves, brooms, rakes, and pitchforks; muslins, flannels, laces, and shawls; sometimes in winter, a dead porker is hung up by the heels at the door; frequently, frozen fowls, turkeys, and geese garnish the entrance. The shelves are filled with a thousand things required by civilized man, in the long list of his wants. Here you see a display of glass and crockery, imported, perhaps, directly by this inland firm, from the European manufacturer; there you observe a pile of silks and satins; this is a roll of carpeting, that a box of artificial flowers. At the same counter you may buy kid gloves and a spade; a lace veil and a jug of molasses; a satin dress and a broom; looking-glasses, grass-seed, fire-irons, Valenciennes lace, butter and eggs, embroidery, blankets, candles, cheese, and a fancy fan.

"And yet, in addition to this medley, there are regular milliners' shops and groceries in the place, and of a superior class, too. But so long as a village retains its rural character, so long will the country 'store' be found there; it is only when it has become a young city that the shop and warehouse take the place of a convenient store, where so many wants are supplied on the same spot.

"It is amusing once in a while to look on as the different customers come and go. Some people like shopping in a large town, where all sorts of pretty novelties are spread out on the counters to tempt purchasers; but there is much more real interest connected with such matters in a large country store, whatever fine ladies tossing about laces and gauzes at Beck's or Stewart's may fancy. The country people come into the village, not to *shop*, but to *trade;* their purchases are all a matter of positive importance to them, they are all made with due forethought and deliberation. Most Saturdays of the year one meets farm-waggons, or lumber-sleighs, according to the season, coming into the village, filled with family parties—and it may be a friend or two besides—two and three seats crowded with grown people, and often several merry-faced little ones sitting in the straw. They generally make a day of it, the men having, perhaps, some business to look after, the women some friends to hunt up, besides purchases to be made and their own produce to be disposed of, for they commonly bring with them something of this kind; eggs or butter, maple-sugar or molasses, feathers, yarn, or homespun cloths and flannels.

"At an early hour on pleasant Saturdays, summer or winter, the principal street shows many such customers, being lined with their waggons or sleighs; in fact, it is a sort of market-day. It is pleasing to see these family parties making their purchases. Sometimes it is a mother exchanging the fruits of her own labours for a gay print to make frocks for the little eager, earnest-looking girls by her side; often the husband stands by holding a baby—one always likes to see a man carrying the baby—it is a kind act—while the wife makes her choice of teacups or brooms; now we have two female friends, country neighbours, putting their heads together in deep consultation over a new shawl. Occasionally a young couple appear, whom one shrewdly guesses to be betrothed lovers, from a peculiar expression of felicity, which in the countenance of the youth is dashed, perhaps, with rustic roguery, and in that of his sweetheart with a mixture of coquetry and timidity; in general, such couples are a long while making their choice, exchanging very expressive looks and whispers while the bargain is going on.

"It sometimes happens that a husband or father has been either charged with the purchase of a gown, or a shawl, for some of his womankind, or else, having made a particularly good sale himself, he determines to carry a present home with him; and it is really amusing to look on while he makes his selection—such close examination as he bestows on a shilling print is seldom given to a velvet or a satin; he rubs it together, he passes his hand over it with profound deliberation; he holds it off at a distance to take a view of the effect; he lays it down on the counter; he squints through it at the light; he asks if it will wash—if it will wear well—if it's the fashion? One trembles lest, requiring so much perfection, the present may after all not be made, and frequently one is obliged to leave the shop in a state of painful uncertainty as to the result, always hoping, however, that the wife or daughter at home may not be disappointed. But male and female, old and young, they are generally a long time making up their minds.

"A while since we found a farmer's wife, a stranger to us, looking at a piece of pink ribbon; we had several errands to attend to, left the shop, and returned there again nearly half an hour later, and still found our friend in a state of hesitation; a stream of persuasive words from the clerk showing the ribbon, seemed to have been quite thrown away. But at length, just as we were leaving the shop for the second time, we saw the ribbon cut, and heard the clerk observe—'Six months hence, ma'am, you'll come into town expressly to thank me for having sold you three yards of that ribbon!'

"It frequently happens, if you are standing at the same counter with one of these hesitating purchasers, that they will appeal to you for advice as to the merit of some print, or handkerchief, &c. &c."

To this lively sketch of American manners, we shall add but one other specimen of our extremely agreeable and instructive authoress:—

"The old Dutch colonists had a singular way of keeping this holiday; Judge Benson gives an account of it. It was called *Vrouwen-Dagh*, or woman's day. 'Every mother's daughter,' says the Judge, 'was furnished with a piece of cord, the size neither too large nor too small; the twist neither too hard nor too loose; a turn round the hand, and then a due length left to serve as a lash.'

"On the morning of this *Vrouwen-Dagh*, the little girls—and some large ones, too, probably, for the fun of the thing—sallied out, armed with just such a cord, and every luckless wight of a lad that was met received three or four strokes from this feminine lash. It was not 'considered fair to have a knot, but fair to practise a few days to acquire the *sleight*.' The boys, of course, passed the day in a state of more anxiety than they now do under the auspices of St. Valentine; 'never venturing to turn a corner without first listening whether no warblers were behind it.'

"One can imagine that there must have been some fun on the occasion, to the lookers-on especially; but a strange custom it was. We have never heard of anything like it elsewhere. The boys insisted that the next day should be theirs, and be called *Mannen-Dagh*, man's day, 'but my masters were told the law would thereby defeat its own purpose, which was, that they should, at an age, and in a way most likely never to forget it, receive the lesson of *Manliness, never to strike.*' As the lesson has been well learnt by the stronger sex in this part of the world, it is quite as well, perhaps, that the custom should drop, and *Vrouwen-Dagh* be forgotten. But after this, who shall say that our Dutch ancestors were not a chivalrous race?"

AGINCOURT.

Mr. Hunter's Critical and Historical Tracts, No. I. Agincourt. Smith.

Mr. Joseph Hunter has commenced this series of mingled antiquarian research with an exceedingly interesting tract. No day in the annals of England shines more brightly through the shades of time than Saint Crispin's ever-glorious day; on which military skill and superior tactics contributed as much as prowess to a victory the most complete, and achieved with so inconceivably small a loss on the part of the conquerors. With regard to the battle itself, this publication affords nothing new; in fact, it does not touch on the stirring theme, and therefore we will say nothing about it, except to mention a circumstance which may possibly elicit some intelligence from any antiquarian friend who can throw a light upon the subject. We have seen, when and where we regret to confess we have forgotten,* an ancient topographical plan of the field of Agincourt, with the positions of the hostile armies. From this it appeared that the French had to attack the English drawn up on an advantageous position, and as they advanced, had to encounter the difficulty and danger of a gorge, narrowing, funnel-wise, towards the well-secured posts of their desperate enemies. It was in penetrating through this pass that they were exposed to the destructive flight of the English arrows, and their first lines thrown into confusion and virtually defeated with much slaughter before striking a blow. The rest of the battle is well understood. The confusion and panic were communicated to the whole host, and the admirably conducted assaults of our countrymen, led by their heroic king and his great warrior commanders, finished the immortal triumph. [Have any of our archæological correspondents met with this valuable illustration?]

But to return to our author. His intelligence relates to the expedition as it left England, from Southampton, to the mortality at the siege of Harfleur, and to the return home of the victors after the fight. The terms on which they engaged to serve, the casualties that attended them, and the final settlements of their claims by the royal exchequer, supply a fund of very curious matter, and throw new lights upon the history and actors of this "ever to be remembered" event.

"If we are mark'd to die, we are enough
To do our country loss; and if to live,
The fewer men, the greater share of honour.
God's will! I pray thee, wish not one man more.
* * * * *

"This day is call'd—the feast of Crispian:
He, that outlives this day, and comes safe home,
Will stand a tip-toe when this day is nam'd,
And rouse him at the name of Crispian.
* * * * *

"This story shall the good man teach his son;
And Crispin Crispian shall ne'er go by,
From this day to the ending of the world,
But we in it shall be remembered:
We few, we happy few, we band of brothers;
For he to-day that sheds his blood with me,

* Probably among some French local archives, or the document brought from such a repository to this country. We ought to have made a note at the time, but the outline is distinctly impressed on our mind.—Ed. *L. G.*

Shall be my brother; be he ne'er so vile,
This day shall gentle his condition:
And gentlemen in England, now a-bed
Shall think themselves accurs'd, they were not here;
And hold their manhoods cheap, while any speaks,
That fought with us upon Saint Crispin's day."

"What I propose, (says Mr. Hunter,) is only this:—to offer an instalment from evidence, which, having been for centuries deeply buried in the unknown masses of the national records, has lately been by me brought to light, in pursuance of orders from the Right Hon. the Master of the Rolls, the general custos of the ancient records of the kingdom, towards a complete list of the English commanders who served with the king in that expedition, most of whom were present at the battle, with, in most cases, the number of the retinue which each commander undertook to bring into the field, derived from the same evidence, and in some instances notices of events happening to the contingents, when the evidence supplies them. I do not propose to go for either name, retinue, or events, beyond the line within which, to my own knowledge, all that will be stated rests on contemporary authority of the most unquestionable kind. And having done this, I stop. It is no part of my design to make the fact of a particular person having been present in this expedition, a pretext for compiling a biographical notice of him, which would be very easily done with respect to many of them, and could not be done at all with respect to others. Occasionally I may take a fact from Dugdale to complete the story, but this will rarely be done: and having mentioned Dugdale, I will add that, though many of the persons whose names will come before us are to be found in his 'History of the Baronage,' yet with all his knowledge of the national records, he was not in the least acquainted with those on which I proceed, so that this little Tract contains several things which will require to be added to his account of the peers of the reign of King Henry the Fifth, whenever that great work of his shall be remodelled and rewritten.

"For the same reasons for which I withhold myself from attempting to compile lives of the several persons whose names will come before us, I shall forbear from any attempt at deducing genealogical lines from the heroes of Agincourt, and shewing who in these times may claim the honour of being their representatives, according to the principles of family representation as understood in England. This, as before stated, would be no difficult task in respect of some, impossible in respect of others. I may remark, however, that the cases would be but few, in which even the best informed genealogical antiquary could shew a *male heir* (by which I mean a person descended in an unbroken male line) to any of those heroes, in any conspicuous position in the country. Look only at the List of Earls, Barons, Bannerets, and Knights: how few of the names are now eminent in England. There are some striking remarks on the rapid extinction of male lines in the Preface to Dugdale's Baronage. But we need not look so far back as to the persons of whom he treats, many of whom lived in ages of civil war, and when the triumph of parties in the State was too often signalized by the violent deaths of their opponents. King James the First created thirty-one earldoms, to continue as long as there were male heirs of the grantee existing; only nine of which now remain. King Charles created thirty-three, of which only seven remain; that is, sixteen out of sixty-four families at the end of little more than two centuries. Of the twenty-nine created by King William and Queen Anne, nineteen are extinct. This is a curious subject, never investigated as it ought to be."

This is a remarkable statement, and must (though not conclusive against them) bring into question many a family assertion of descent from some hero of Agincourt. The process of engaging and assembling the invading force is also extremely curious:—

"There were antecedently to the actual commencement of the campaign, three distinct indentures entered into by the leaders, chiefs, or captains, namely: one of *Military Service*, one of *Receipt of Prest Money*, and one of *Jewels in Pawn*.

* * * *

"The Indenture of Military Service was for one entire year to attend the king in the journey he was about to undertake in person to Guienne and the parts of France, with a determinate number of men at arms and archers, or with archers only. The vadia of the contracting party and his retinue are specifically set down: a duke had 13s. 4d. a day; an earl, 6s. 8d.; a baron or banneret, (for their pay was the same,) 4s.; a knight, 2s.; a man at arms, 1s.; and an archer, 6d. There was also the further advantage of what is described as the 'Regardum Consuetum,' which was 100 marks per quarter, for every 30 men at arms. These indentures also contain the provisions respecting prisoners taken by the party. If the prisoner was a man of eminent distinction he was to be the property of the king absolutely; but the ransom of prisoners of inferior note was to be divided between the king and the captor. Most of the indentures of this class which remain are dated on the 29th day of April, in the third year of the reign, A.D. 1415; and the commander engaged to be at Southampton with the retinue on the 8th day of July. The Indentures of the Receipt of Prest Money bear date on the 1st of July. The Indentures, by which the receipt of the Crown Jewels and Plate is acknowledged, are, for the most part, dated in the month of June. Collectively, these indentures present, what to me was an unexpected and quite a dazzling view of the wealth of the old sovereigns of England in silver and gold plate, and in the choicest work of the goldsmith.

"It is manifest that had all the indentures thus entered into descended to our time we should have had little reason to regret the want of contemporary muster-rolls, or any other kind of evidence, for the purpose of forming a complete list of those persons who are to be regarded as the captains of the English host. Many, however, have perished, and others are faded, torn, and otherwise injured, through the cruel neglect of persons to whom, in past ages, these valuable documents were intrusted for their safe keeping. Measures have been taken to recover them from the mass of incongruous matter with which they were intermixed, and to preserve them for future times, under the new, and it is to be hoped, better administration of record affairs.

"But, beside these indentures, there are other contemporary documents in the same repositories, relating to this expedition, equally authentic, and often containing what the indenture could not shew us; particulars of the service rendered, and of the fate of the commander and his retinue. These documents are the *Accounts* which were presented at the Exchequer when the expedition was over, by the persons who had indented, or by their representatives, or in other words, their claim upon the government for their pay. The manner in which the Treasurer and Barons of the Exchequer were to proceed in respect of these accounts is particularly described in instructions given them by the king, enrolled on the Memoranda Roll of the King's Remembrancer, for Hilary Term, in the 4th of the reign, the purport being this:—The express words of the indenture are to be the basis of the settlement: those, however, who had died at the siege of Harfleur, or who had returned home sick, as so many did, or who had returned home for any other cause with the king's licence, were to be considered as having served for one quarter of a year. Those who were left in Harfleur for the safeguard of the town, were to be accounted with, upon their own oaths, to the time when they entered the town, and from that time to the end of the second quarter, on the testimony of the captain of Harfleur, or his lieutenant, on the terms specified in the indenture. Touching those who had gone on to the battle of Agincourt, and had died there, or who had proceeded with the king from Agincourt to Calais, the claim which was to be allowed on their account was for the whole of the first quarter, and from the commencement of the second quarter to the eighth day after the king's arrival at the port of Dover. In respect of some, whom the king countermanded at Southampton, their captains are to be allowed the sum stipulated, for those of the retinue who actually crossed the sea but not for those who remained in England: and lastly, no allowance was to be made for any who were left in England on account of the want of shipping. * * * * * * *

"It is (adds our author,) not known at what period, or by whom they were taken down, but they have in past times, been treated in a manner, which if the evidence were not before us, would be thought incredible. Eminently interesting as they are as monuments of an event which stands prominently forth in the history of both France and England, and authentic vouchers as they are for many facts connected with that event in the history of particular families, they have been thrust into holes and corners in the caverns of the Exchequer, they have been trodden under foot, and subjected to all kinds of depredation and destructive processes. Some which had been suffered to remain in their pouches, are, however, in a singularly beautiful state of preservation, fresh and fair as when they were first prepared by the great masters of caligraphy by whom they were executed. But for the most part they had been removed from the pouches, and were mixed with other matter, when I was called upon to make the orderly distribution of this mass of confusion, which is now nearly completed.

"It will be seen that the instances are very rare in which we can produce the three Indentures, the Account, and the Retinue Roll. Sometimes all we have is but one of the Indentures, sometimes an Account only, and sometimes only a fragment of a Retinue Roll. Any one of these, however, serves as evidence of, at least, the intention to go, and perhaps, with the exception of the Earl of Cambridge and the Lord Scrope, who had indented, but who were put to death just when the expedition was on the point of sailing, there is little room for doubt, in any case, that the intention was carried out.

"These then are the very authentic documents out of which the following catalogue is formed.

* * * *

"A general Roll prepared by Sir Robert Babthorpe, the Comptroller of the King's Household, of all persons, of whatever rank, who were with the king in that battle," is, it is feared, irrevocably lost, "though it is certain that such a Roll was prepared, was delivered into the Exchequer, and was committed to the charge of the King's Remembrancer to be for ever preserved by him."

It is sad to have to deplore the loss of so invaluable a national document.

The king's pawns of plate and jewellery will astonish every reader. The amount is immense, and Henry let his regal crowns go among the rest of these costly treasures, the descriptions of which may furnish hints for many designs to add to the present imitations of mediæval vertu. He gives one of his crowns in pledge to his cousin, the Duke of York, and to his other cousin, the Earl of Cambridge,* (the former slain at Agincourt, and the latter executed at Southampton), a lot of valuables, as enumerated in the indenture, of which the following is a partial specimen:—

"Vn g^{a}unt espiceplate dor garniz enuyron p'my tout la couercle ouesq' la somoyt & cynk egles enamellez blank dount vn eiant vn g^{a}unt bales pendant en le beek & les quatre autres ch'un eiant

* These unfortunate princes, sons of Edmund of Langley, and grandsons of Edward III., severally covenanted to bring with them, the Duke of York, 1 banneret or baron, 4 knights, 94 esquires, and 300 mounted archers, the Earl of Cambridge, 60 lances, and 160 archers.

vn grose perle pendant en lour bekes & xvij. baloys xvj. safres vj. groise perles p'amont xxiiij. dyamauntz ccccxxix. perles & deins le founce du dite espiceplate vn egle ennamele blank ouesq. vn safre pendant p'son rostre & ent oure mesme le egle iiij. baloys & iiij. g^undes perles & enuyron le bastone iiij. baloys & iiij. safres poisant le dit espiceplate ouesq. le couercle xx.*li.* & iiij.onces de troye la price en tout Dclxvj.*li.* xiij.*s.* iiij.*d.* It'm le palet de Spayne garnise dor ouesq. vne corone garnise dor tout ensemble xxxiij. baloys & rubies bastarde iiij. safres xv. emeraudes & autres t'spetitz en g^unt nombre & cciiij^xx. perles la poys de mesme le palet viij.*li.* & demy la price de mesme le palet en tout clxvj.*li.* xiij.*s.* iiij.*d.* pur la seurte de Dcccv.*li.* iiij.*s.* iiij.*d.*"

The lists of the leaders and their followers and contingents, and the ascertained fate of many of them, will be read with intense interest. Among them were,—

"Ten knights or esquires of the county of Lancaster, always famous for its bowmen, who entered into separate covenants with Sir Robert Urswick, the sheriff, to bring each 50 archers."

There were also attached to the expedition civilians, including,—

"Edmund Lacy, Dean of the Chapel, 'deinlostell n're Seigneur le Roy,' and 30 chaplains and clerks of the said Chapel. The Dean having 3 archers attending upon him, and the 30 chaplains and clerks having each an archer."

Also—

"Thomas Moristede and William Bradwardine.—They covenanted to serve with 6 archers and 11 'sirgiens,' and received jewels in pawn on the 20th of June. Bradwardine had 3 archers with him.

"John Cliffe, minstrel.—He had it in command from the King to attend with 17 of his companions. His pay was 12d. a day. He appears to have served through the whole campaign and to have returned to England with the King; but he was dead when the Account was rendered.

"Sir William Troppenel, Knight, 'serviens scissorie infra Magnam Garderobam Regis Henrici quinti."—His vadia was 12d. per day, without the *regardum consuetum*. He had 2 archers and 6 valets in his company. He was ready at Southampton on the 8th of July, and claims for service to the 16th of November, on which day the king landed at Dover. In the Indenture of Jewels we obtain further insight into the kind of service rendered by Troppenel. He is there described as 'William Troppenel, sergeant de la Taillerie,' and he indented to bring 6 archers and 6 'vadlets taillours.'

"George Bennet, cordwainer of London.—He claims for himself at 12d. a day, and for 24 other persons of the same craft, at 6d. They were with the army during the whole period.

"There were also labourers or workmen of all kinds;—100 masons, at the head of whom was John Bennet; 120 carpenters, at the head of whom was Thomas Matthew; 120 miners, the chief of whom was Henry Deane; 120 labourers, under Reynold John; 42 smiths, the chief of whom was William Marsh. Peter Gascoign was the chief of 24 cannoniers and 68 'serviteurs.' John Southmade had 15 carriers under him. William Marsh is designated 'esquire.'"

Further, Mr. Hunter states, in observing upon persons not named in these documents, but who are known to have been present in the expedition,—

"We recognise one name which is remarkable, John Hardyng, the chronicler; of whom it is known, from other authorities, that he was with the king at Harfleur and Agincourt. John Waterton was Master of the Horse, and in the Account which he rendered of that office, for the Agincourt year, we find some particulars relating to this expedition. At the beginning of the year the king's stud consisted of 233 horses, many of which were taken by the king to France, where some died of the murrain, and 25 are returned as having been killed or lost at Agincourt. The horses so lost are specifically named—Lyard Stirkland, Lyard Gloucester, Grey Cornwall, Lyard Coke, Bayard Chaucer, Morell Kene, Lyard York, Sorell Tawstock, &c. Most of the names seem to be those of persons by whom they had been presented. Only 98 horses remained to be carried to the next year's account.

"Many persons, who were of the king's household, were also in the expedition."

With this we close a little book which has greatly interested us; and have only to remark, that a large majority of the widows who claim on acconnt of their husbands lost in this campaign, seem to have lost no time in providing themselves with second protectors.

DISEASES OF THE EAR.

Report of the Royal Dispensary for Diseases of the Ear. By W. Harvey, M.R.C.S. 1850.

We well know the importance publishers attach to having a "taking title" to their publications; we know, too, more works than one which it is allowed would have had no sale whatever, but for the promise which the name given at their christening seemed to hold out. Now, here is a book of some dozen pages, with a title far from attractive, and it contains, nevertheless, many a remark that we believe will be new to most persons, and on a subject, too, that concerns them all most intimately,—on that beautiful and delicate organ, the ear.

In the Report of this excellent institution, we are told how causes little dreamt of will operate on the organs of hearing, the remedy for many of which lies solely within the province of the legislature. After reading these pages, we were forcibly struck by the reflection of how great the evil—aye, how great the sin—of neglecting those sanitary regulations which only a government has the power to carry out. For the structure of the human ear is so exquisitely beautiful, that not only will inattention to the digestive organs, drunkenness, or a blow on some other part of the body, be injurious to the organ of hearing, but even the state of the atmosphere exercises an influence; "and hence it is not surprising to find those who reside in damp and confined situations much subject to deafness."

Regarding the cure of deafness, one thing Mr. Harvey seems to consider as certain: that if attended to on the first appearance of anything like disorder of the organ, relief is sure. "There has," he says, "been scarcely a case of incipient deafness treated at this institution, in which the patient, if he scrupulously adhered to the directions and treatment prescribed, was not benefited."

It would seem that the number of affections of the ear are increasing rather than diminishing; and although cases of this sort do not present themselves to us with that bold and sudden appeal to our sympathy as those of loss of sight or of the limbs, they might claim it in an equal degree; for the sufferer is cut off from the means of social enjoyment, which is often all that the poor man has to gladden him. It has been maintained, and we believe with justice, that the loss of hearing is a greater calamity than loss of sight. But, as we said before, it does not come before us in those harrowing forms which other evils to which man's nature is subject assume: we comprehend at once the situation of the blind beggar, as he gropes his way past us in the streets, and the palsied cripple brings his woes before us in all their dreadful reality; but the deaf artizan crosses our path, and we know nothing of his privation. Yet he it is who is suffering the loss of the noblest organ of our body.

We cannot well over-rate an institution like this, where in one day as many as ninety-one persons have sought relief—a number which at once shows the prevalence of aural diseases, and the necessity of some means for their relief. The institution has been nobly supported by the wealthy and the charitable; and well did Lord Ashley show, that the doer of a good act eventually reaps the reward, when he said, "Institutions which brought masses of the poor to them, in order to obtain relief from pain or other bodily infirmity, led their medical officers into an amount of knowledge which they could not have acquired without; which information was not only afterwards applied for the benefit of the poor themselves, but of the highest and most dignified personages in the state."

SUMMARY.

Emperors of Rome, from Augustus to Constantine; being a Continuation of the History of Rome. By Mrs. Hamilton Gray. 12mo. Hatchards.

An ably-compiled school book, in continuation of Mrs. Gray's former two volumes, and illustrated, like them, with numerous useful wood engravings of objects of interest to the student of ancient history. The style is clear and simple, and the narrative told in a pleasing and impressive manner.

Homer's Iliad, Books I—IV. With a Critical Introduction, and copious English Notes. By the Rev. Thomas Kerchever Arnold, M.A. 8vo. Rivingtons.

Another school book, but intended, according to the author's preface, "not for the mere beginner, but for the pupil of more advanced age, who is fitted by his general knowledge of the laws of Greek construction to commence the critical study of Homer." The student is materially assisted in his study of the blind bard by a useful compilation from the German critics, including an abridgment of Thiersch's Treatise, and copious notes, extracted from the works of Nägelsbach, Freytag, and Crusius.

The Theory of Human Progression. 8vo. Johnstone and Hunter.

That we have been and are advancing to a reign of universal justice is the author's creed. He adopts the theory of Cousin, to whom the work is dedicated. It is an elaborate performance, and the conclusion come to is, that when mankind arrive at perfection of knowledge founded on ontology they will learn to be perfectly happy,—in unity one with another. Progress is the word, and a philosophical millennium the finale.

Tales and Sketches, in Prose and Verse. By the Hon. Mrs. Norton. Churton.

A reprint in Mr. Churton's Library for the Million, of a selection from some of this accomplished authoress's favourite works.

ARCHÆOLOGY.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

THE seventh annual meeting of this Association will be held at Manchester and Lancaster on Monday, the 19th of August, and five following days. From the programme of the intended proceedings of the Congress, we anticipate for its members an interesting and improving meeting. The meeting will be opened at Manchester on the Monday, adjourn to Lancaster on the Tuesday, visit Furness Abbey on the Wednesday, and return to Manchester in time for the evening meeting on Thursday. Many highly interesting papers by eminent archæologists are announced, and an opening address on the Study of Archæology and the particular objects of the Association, by the eminent treasurer, Mr. Pettigrew.

SUSSEX ARCHÆOLOGICAL SOCIETY.

THE annual meeting of this young but vigorous society, held on the 25th of July, presented the same interesting features that have marked all its previous meetings. Herstmonceux was the spot selected by the committee, and a more interesting one could not have been desired. The castellated manorial mansion of the Fyneses—the earliest brick building in the kingdom, having been erected in the course of the fifteenth century, —the church, with its noble monuments, and the rich sylvan scenery of the adjacent country, possess charms for a wider circle than that of the genus *Archæologist*—numerous and respectable as that class has lately become. In spite of a drenching rain, which continued nearly the whole day, the assemblage was numerous and respectable, including the Earl and Countess of Chichester, Lord Carbery, the Lady Mayoress, the Dean of Chichester, H. M. Curteis, Esq., M.P., and many other personages, eminent either for social influence or for archæological attainments. The chair was taken at two o'clock, by the Venerable J. C. Hare, Archdeacon of Lewes. The hon. secretary, W. H. Blaauw, Esq., read the report, which attested the continued prosperity of the society, which now numbers 360 members. The society had just issued its third volume of *Sussex Archæological Collections*, which it was hoped would sustain the high character of its predecessors. Measures had been taken for renting the keep of Lewes Castle as a county Archæological Museum, and upon the motion of the Very Rev. the Dean of Chichester, seconded by the Rt. Hon. the Earl of Chichester, a resolution empowering the committee to carry their arrangements into effect was unanimously agreed to.—The Rev. Edm. Venables read a paper "On the Descent of the Castle of Herstmonceux," which evinced profound research, and excited much interest. The Rev. C. Bohun Smyth, of Alfriston, read an essay, entitled, "Glimpses of the Anglo-Saxons in Sussex," an eloquent paper on a good but little-studied subject. The third paper was by Mr. Mark Antony Lower, on "Wills of early inhabitants of Herstmonceux," which proved, as Mr. Lower observed, that the husbandmen of the sixteenth century in this locality were but slightly advanced in point of luxury and refinement from their ancestors of the Anglo-Saxon era. Mr. Butler, jun., of Chichester, described the mural paintings lately found in Stedham Church, including figures of St. Ursula and the well-known *myth* of St. Christopher. The Rev. L. V. Harcourt expatiated at great length upon the latter saint and his story, already familiar enough to every antiquary. Among the objects exhibited were many paintings, drawings, plans, and elevations of Herstmonceux Castle; rubbings of brasses; relics from the Holy Land; Roman pottery and other relics from Balmer; a piece of Elizabethan tapestry, from Mr. J. R. Smith; a curious knight on horseback, in pottery, by Mr. Figg; a restored view of the castle, from Mr. W. Harvey; a rubbing of the monumental iron slab of Anne Forster, of Crowhurst, in Surrey, dated 1591, and lately found serving the purpose of a fire-back in a cottage near Lewes, from Mr. Lower; Roman lamps from the catacombs, with Christian symbols, by the Rev. J. Turner, &c. &c.—At half-past four, the company adjourned to a curious old barn of mediæval date, called Court Lodge Barn, a fine specimen of the baronial *grange*, with a good open-timbered roof of chesnut, which would do credit to a church of its own era. This was decked with branches of trees and bouquets of every hue, and laid out as a dining-hall, with a substantial cold collation. After dinner, the meeting was addressed by Archdeacon Hare, Lord Chichester, the Dean of Chichester, Messrs. Blaauw, Venables, Smyth, Blencowe, &c., in terms eulogistic of the study of antiquity as a great moral advantage to a civilized community. During the whole of these proceedings the rain had poured down, just as we are assured it always has done on St. James's-day, "from the beginning of the world!" In spite, however, of this "great discouragement," many of the members afterwards paid a visit to the castle, and we observed not a few of the gentler sex scorning wet grass and prospective coughs in making this interesting pilgrimage. The presence of upwards of 150 persons on such a day, in a village remote from any considerable seat of population, and at a distance from the "Rail," afforded a convincing proof of the zeal with which the intelligent classes are now so happily animated in the delightful science which originated the meeting.

CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.

THE annual meeting of this Association, established in 1846, for the purpose of promoting the study and preservation of the antiquities of Wales and its neighbourhood, is announced to be held at Dolgellau on the 26th inst., and five following days. The locality is judiciously selected, as objects of interest to visitors abound in the neighbourhood, among which may be enumerated the Celtic remains on the hills between Barmouth and Maentwrog, and on the chain of Cadair Idris, and the Roman remains in the neighbourhoods of Bala, Machynlleth, and elsewhere. Harlech Castle and Cymmer Abbey, specimens of mediæval architecture, are also in the vicinity.

FINE ARTS.

SALE OF THE GALLERY OF THE LATE KING OF HOLLAND.

THE sale of the splendid gallery of the late King William the Second is appointed to take place at the Hague on the 12th of August and following days, as previously announced. This gallery, formed with so much taste, and at so much expense, is about to be dispersed; and many reports have been in circulation as to its future destiny. On the one hand it was asserted, that the Queen Dowager of the Netherlands had resolved on making the greatest sacrifices, rather than it should leave the country; on the other, that the Emperor of Russia was on the point of purchasing it *en masse*, to increase the importance of the Museum of the Hermitage. Neither of these presumptions has been realized—the gallery is to be brought to the hammer. Every school is admirably represented in this collection. Among the masters of the old Flemish school, are to be found Van Eyck, Emmeling, Quentin Matsys, Mabuse, &c. About six years ago, a beautiful lot by those painters (whose renown is dear to Belgium), was offered to the Belgian government for a sum which was not high in comparison to the importance of the purchase. It would have been a precious collection to enrich the Museum of Brussels; but money was wanting, and these very pictures, being taken to the Hague, were purchased by William II. Among the Flemish pictures of the late King's gallery, we remark some by Rubens, Van Dyck, and Teniers; among the Dutch, Lucas of Leyden, Rembrandt, Hobema, Ruysdael; among the Italian, Raphael, Titian, and Leonardo da Vinci; among the Spanish, Murillo, Ribiera, and Velasquez; and among the French, Poussin and Claude Lorrain. Some we omit to mention, and they are of the best. William II. possessed also some very fine modern pictures. Gudin, Ary Scheffer, Descamps, and Brascassat had worked much for him. The late King had made numerous purchases from Belgian painters:—MM. Wappers, De Keyser and Leys received numerous orders. On a recent occasion M. Gallait was solicited to execute an important picture for the Royal Gallery of the Hague. We are not aware whether the collection of modern paintings will be sold at the same time as the ancient pictures, but it is stated that the works of the artists, for whom William II. professed particular regard, have been reserved by the Queen Dowager for her private cabinet.—We learn that the majority of the great picture-dealers of Europe, and also a great number of wealthy amateurs, will attend the sale. —*Brussel's Herald.*

THE POLYORAMA.

Allom's Picture of Constantinople, the Dardanelles, and Bosphorus.—We gave a passing notice of the private view, and have now to add it still continues its attractive course; indeed this vivid and highly interesting exhibition should be seen by all who love the fine arts for themselves, or desire to be familiar with scenes full of historical associations. It is one of the giant pictures of the day, and of almost interminable length, yet so fraught with interest as to make the spectator doubt an hour and a half has passed away. The visitor starts from the mouth of the Dardanelles on a pleasure excursion, in company with Mr. Allom, and after viewing the shores, landing at each point of local interest, to peep more closely into the "haunts and ways of men in other climes," to see their buildings—to note domestic habits—mercantile avocations—religious customs, and state ceremonials; journeying again upon the sea he becomes familiar with the Turkish craft and shipping, as well as with the singularly picturesque character of their state barges, the gloomy and solemn castles of Europe and Asia, and so to "the valley of the sweet waters," with its gorgeous fountains—the cemetery—"the Golden Horn"—the slave market, with its groups of interested and the interesting; and then is the traveller shown mosques, divans, and baths, and ultimately led into the subterranean palace, with its thousand columns. Another day's journey brings him to the entrance and full view of the interior of "the Great Church of St. Sophia," simple in its character, but grand and vast in its proportions. It may here be mentioned, that the painter's perfect knowledge of architecture has enabled him to impart a wonderful expression to this oldest of all the churches. The traveller, for so he must be called, having visited Constantinople and its environs, is at last admitted into the gardens and apartments of the Seraglio; and here the architect is again at home. An artist's hand created them, and an artist's hand pourtrays them, with exquisite groups of beautiful women lounging in all directions; this, with the baths, are the very pictures of luxurious ease. Altogether Mr. Allom may take the credit of producing another Arabian Nights' Entertainment. The whole of the theatre has been fitted up at considerable cost, and with great taste; and it seems almost incredible the short space of time the picture has been produced in—not begun, we understand, until after Christmas—the work of one hand, and that hand rendered powerless for a considerable part of the time, in consequence of the death of a fine and noble son in India,—one who was the very admiration of all around him; a sad blow that! and the wonder is, that it has been produced at all. A knowledge that Mr. Allom made all the drawings at each place described contributes much to the truth.

FOREIGN CORRESPONDENCE.

FRANCE.

Paris, Thursday.

THE principal topic of conversation in the scientific circles this week, is the second balloon ascent of Messrs. Bixio and Barral, of which you had a full account in my last. The incident in this aërial voyage which appears most to have interested our *savans*, is the extraordinay fall of the thermometer to 39° below zero or freezing point, when the balloon was at a height of about 7000 yards; a fact extraordinary, because the celebrated Gay Lussac, when he was at the same height, found the temperature only 9·5 below zero—the sky being clear; still more astonishing from the circumstance that at only a few hundred yards lower down, the aëronauts found that their thermometer only marked about 9°. How is this sudden change to be explained? How happens it that the temperature was so excessively cold in the midst of a summer cloud? If any of your readers can answer, they will confer a lasting obligation on our puzzled scientific fraternity.

M. Arago, at the weekly sittings of the Academy, continues his interesting communications on the constitution of light. In the last meeting of the learned corporation, he related the results of an unanswerable mass of experiments extending from 1815 downwards, chiefly as regarded the transmission of light through water, and also, as connected therewith, the density of water in different degrees of congelation. When M. Arago's communications shall be completed, they will afford matter to occupy every scientific head in Europe, and to employ in experiments no end of scientific fingers. They will, it appears, form the most varied and most complete treatise on light which has ever yet been given to the world. Even Lord Brougham's learned labours on the great subject will be completely thrown into the shade by it—notwithstanding the learned and noble lord entertains the most exalted opinion of their merits.

Strange documents are at times sent to the Académie des Sciences; in the last batch, for example, is one of a man who pretends that by means of bleeding, milking, and some other operations, he can make cows "in an interesting situation," give birth to calves of what sex he will; and he hints very broadly that by the employment of similar means it will not be difficult to enable papas and mammas to have baby-boys or baby-girls *à volonté!*

Already is the full effect of the new law on the Press beginning to make itself felt, although it has only been in operation a very few days. A semi-literary, semi-quizzical weekly publication, called *La Silhouette*, has had the extreme good luck, by neglecting to have its sheets duly stamped, to incur penalties to the tune of 6000*l.* sterling,—not a farthing less. Being a non-political and very harmless journal, it thought that it need not get stamps put on a poor romance, published piecemeal in the *feuilleton* form. Judge, then, of the dismay into which unfortunate editors and proprietors were plunged, when the tax-office crew presented a "little account" for six thousand pounds penalty. The immediate annihilation of the journal was, of course, the consequence. Other literary, quasi-literary, and theatrical journals, are also in the agony of death; and a whole host of scientific periodicals, deeming it impossible to live under the law, have "not stood on the order of their going, but gone at once." As for the political papers, they are bearing up as well as they can; but the best of them are awfully discouraged; the second best, feeling the ground ricketty, are trying to bribe the public to subscribe by offering by wholesale what they call "premiums of books;" and the third best, never very stout on their legs, are turning their faces to the wall, as the preliminary to giving up the ghost as decently as possible. The poor provincial journals are, however, in the most pitiable plight,—they are literally dropping off like rotten sheep.

The extra stamp placed on journals which publish romances in their *feuilletons* is making newspaper proprietors exercise all their ingenuity to evade it, without letting their readers perceive it. Thus some of them give biographies, couched in as dramatic a form as possible—others give travels—others fall back on reviews, written in sprightly style—some give the text of popular comedies, and so on. But sooner or later this *supercherie* will be seen through; and it will remain to be ascertained whether that somewhat cross, and always very exacting animal, the subscriber, will be content at being deprived of his usual daily feed of trashy romance

Everything is very dull here—we are in the very midst of *la morte saison*. You will consequently not be surprised to hear that in literature there is nothing doing—in art nothing—in theatres nothing—in music nothing! Indeed, such a stagnation is there that I flatter myself it has required no little skill to find topics to fill this sheet.

SKETCHES OF SOCIETY.

TESTIMONIAL TO DR. CONOLLY.

A MEETING was held at 12, Old Burlington-street, on Saturday last, Lord Ashley in the chair, for the purpose of considering the propriety of offering some testimonial to this eminent and zealous labourer in the cause of the insane. Resolutions were passed to the effect, that Dr. Conolly was eminently entitled to some public mark of esteem and gratitude, for his long, zealous, disinterested, and most successful labours in ameliorating the treatment of the insane; and a committee was formed for making the requisite arrangements for the presentation to him of *a Public Testimonial*, commemorative of his invaluable services, and expressive of the just appreciation of those services by his numerous friends and admirers, and by the public generally. The committee have determined that the most appropriate Testimonial will be a Portrait of Dr. Conolly, to be presented to his Family, an Engraving of the same to be presented to the subscribers. Dr. Conolly deserves this appreciation of his labours. Principally through his exertions, a mild and rational treatment of the insane has been substituted for the cruel brutality which formerly characterized their management.

TESTIMONIAL TO MR. WALKER.

THE persevering, and at last successful, advocate for the abolition of the foul and abominable practice of intramural interment, has been too long before the public to need any introduction to our readers. Ever since the year 1830, Mr. Walker has worked nobly and manfully to effect this great reform. In despite of bigotry, of prejudice, and of interest, in the face of an indifferent public and a hostile government, Mr. Walker has persevered in his denunciation of the metropolitan graveyards, and has, at last, awakened society to the necessity for their removal. Appreciating as we do his zealous labours in this good cause, it is with satisfaction that we have observed that a public meeting has been recently held, for the purpose of originating a suitable memorial of his useful and successful labours, and that arrangements have been made for the payment of subscriptions in furtherance of this object, to Messrs. Coutts.

MUSIC.

Her Majesty's Theatre.—The *Nozze di Figaro* was given on Tuesday for the last time, Sontag being the *Susanna*. For the benefit of Carlotta Grisi on Thursday we had the *Sonnambula*, in which Sontag sang the part of *Amina* as charmingly as ever; this was followed by a selection from *Ernani*, in which Mlle. Parodi, Signors Belletti and Gardoni appeared; and the ballet was composed of the choicest displays of Carlotta's art—the *Giselle* and the *Esmeralda*.

Royal Italian Opera.—*La Juive* (*Second Notice*).—Since our necessarily hurried notice of the first performance, M. Halévy's *chef-d'œuvre* has been repeated three times in succession to crowded audiences, and with a success *d'enthousiasme*, increasing on each representation, in spite of no trifling disadvantages, and of mishaps not a few. Produced at the eleventh hour of a season, "done to death," when all the world are rushing to escape the purgatory of worn and weary streets, and such as remain are ashamed to be visible, *La Juive* has galvanized the *habitués* into a last excitement; and though withdrawn this week, to meet (as we suppose) the exigencies of the "subscription," who, "varium et mutabile semper," are glad to snatch a brief repose from the simooms of Meyerbeer, and the siroccos of Halévy in the "moonlight strains" of Bellini, not to mention the necessity of carrying a few "hummable" airs into the country; it would, we believe, have carried out the month triumphantly. We owe it to the continental celebrity of this opera to record, that it was not till the fourth representation that it received an exposition adequate to its undisputed merits and to the resources of the Royal Italian Opera. On the three preceding occasions it encountered a series of *contretemps* enough to have submerged an inferior work. On the first night, indeed, Mario was replaced with a success commensurate with the conscientious courage and the ability of the artist; on the second, Formes was compelled to resign the *Cardinal* to Zelger, always useful and efficient, and accustomed to this part, but whose nervousness rendered him halting and uncertain on so sudden a call. Mario had taken up his *rôle* with a zeal most praiseworthy, but most unfair to his own reputation; risking his laurels on an imperfect essay; for to so high a position as his, to be *not excellent*, is to fail altogether. On the third evening Formes resumed his place, and Mario was somewhat less suffering and weak, but still very far from being up to the mark. Were we writing our impressions of that Tuesday's performance, we should be very shy about the *Lazaro*, after the high expectations we had not feared to hold out of a new triumph for the Italian tenor. We returned from the theatre quite disheartened, full of jealous and exacting memories of the great French *Eleazar*, and reluctantly convinced that here at least there was no successor to Duprez. It would be superfluous to allow that Mario acted with distinction, and did not miss wholly the great points: but in his singing there was so evident a lassitude and exhaustion, so marked and distressing a timidity in attacking the higher range of the chest voice, in phrases, too, which fall dead if not delivered *à pleine voix*, that even the tender and melancholy grace with which he *wept* the lovely air "Rachele, quando à me" (for his voice was the melody of tears), could not beguile us from the sense of a deep disappointment; and we *improvised* a suspicion that his voice had perhaps been losing in strength and confidence for some weeks past. The *Jew* of Duprez haunted us like some recollection of Rembrandt, with that concentrated expression of dark hate and inextinguishable contempt, as if "crouching to spring," as he cursed the Christian seducer—as he tortured the *Cardinal* with muttered revelations of his daughter's fate—and as he hissed into his ear the last reply to the agonizing question—

"Ou est donc ma fille?
Là! Voilà!"

But nobly did Mario avenge himself on the fourth (Thursday) night, excelling in many respects, both as a singer and actor, all the former triumphs of his most dangerous rival—himself. His very first entrance on the scene, with the *Jewess* on his arm, proved confidence and energy regained; and the earnest identification with the character augured a grand success. We should write down almost every phrase of his throughout the opera, if we attempted to do full justice to this splendid vindication. Mark the fire he threw into his first words,—

"E perchè no
Non sono Israelita;"

The bitter sadness of

"Diletta Figlia fuggiam lontani;

The cringing mockery, the fawning greed of the couplets

"Viva sempre l'amore;"

The majestic rage and grief of

"Maledizion d'un padre offeso;"

And the fearful intensity of

"Iniquo è vil Christiano;"

The haughty, defiant insolence of

"Ebben, prodi Signori;"

The triumphant malice of

"Purtroppo è ver! *Respira*
La figlia tua tuttora."

The awful calmness and pent up emotion in

"O figlia, io vo morire;
Viver vuoi tu?"

With the reply

"*Non io!*"

And the appalling accentuation of a revenge complete, but how dearly bought! in

"Eccola!"

These are but a few of the salient points of strength and beauty in an impersonation to be compared with the *Othello* of Kean, and the *Virginius* of Macready. Mario can never hope to excel this creation, and we trust he may not soon consent to derogate from its perfection. We have scarcely alluded to his singing. He was never in finer voice, and made the house ring again in passages delivered at the top of the chest voice with perfect ease. But nothing is more remarkable in Mario than the admirable method with which he eludes the perils while fulfilling the necessities of this exhausting music, which Duprez used to say (speaking of his own style) had been the murder of a whole generation of "robust tenors." Viardot's *Rachel* is, purely and simply, sublime. Witness her delivery of the reply to the Cardinal in the second scene of the last act—

"*Card.*—Ne ti riman speranza?
Rachel.—Me ne resta una ancora,
Di salvarlo e percir."

A fine stroke of art in the conduct of the plot is the irrepressible, strange sympathy which attracts the proud *Cardinal* to the fortunes of the persecuted Jew, and the bodeful reluctance with which he is driven to be the unconscious instrument of the fate of his own child. This dark thread running through the whole drama, like an ancient Nemesis, imparts a sense of fatality to all the scenes in which the Priest, the outcast Hebrew, and the lost daughter are brought into contact. But it is in the last scene that Viardot has one of those subtle inspirations which no stage-trick can teach, and no mere "talent" suggest. It is a touch of *nature*. All the brutal paraphernalia of the platform, and the caldron, and the turbulent mob, have not dismayed her from asserting the innocence of *Léopold*, the last proof of love, stronger than desertion and death itself! and it is only when the fateful penitential dirge, lik a chant of ghosts, wails out a dismal prayer for her forgiveness, in response to *Ruggiero's* sentence of death—

"Ser l'errore il gran Dio sia clemente,"

that the brave forgiving heart of purity and innocence is struck, and her blood curdled as by the icy breath of the grave in the midst of youth, love, and beauty! It is only then that she sinks back cowering into the Jew's arms, and with face buried in his embrace, and in a whisper that sends an involuntary shudder to the most frivolous listener, utters—

"Padre mio ... qual tremore
Questo funebre canto
M'agghiaccia di terror."

Formes, since his resumption of the part, leaves little to be desired as the *Cardinal*, singing more collectedly, and indulging less his besetting propensity to drag the time. His acting in the last scene is of a very high order of dignity and pathos.

We had omitted to notice on a former occasion the sparkling ballet music which (notwithstanding great excisions) has so large a share in the third act, and in which Mdlle. L. Taglioni won a deserved recognition for her charming malicious grace in a valse, and for the precision and *aplomb* of her dancing in a pas *sur les pointes*.

On the whole, it is not difficult to conceive that so powerful a drama, set in so magnificent a framework of scenic illustration, should strike even the most *blasé* audience in Europe with a new sensation. But the rich and varied costume, the elaborate and costly appointments, the imposing masses organized with strict fidelity to historic portraiture, and the nicest attention to the minuter accessories, are mere vulgar attractions. It is ever the genius of the interpreters that gives life.

One word more on the music. So sharp is the "strife of tongues" on the merits and defects of M. Halévy, that we should be sorry not to do justice to the illustrious composer, and to our own convictions. We are not of those who deny to the composer of *La Juive* the possession of considerable powers. We concede to him a very high position (but not the highest) as a sound and accomplished musician, neither destitute of originality nor of invention; never trivial nor (if sometimes heavy) dull; always evincing study, purpose, dramatic skill, for which we can well dispense with a facility in "composing" barrel-organ "tunes." But as we have before observed, he seems to be ever tantalizing on the brink of grandeurs and beauties: and then, to balk himself and us by losing the idea of his theme, mistaking noise for combination, and aridity for science. Cleverness, talents, ripe instruction, entire readiness in orchestral resources, knack in instrumentation *esprit, habileté;*—all these separately or combined never can replace *genius*. Forgetting for a moment the names of Mozart, Beethoven, Gluck, Handel, Mendelssohn, Weber, Meyerbeer, how will M. Halévy stand even in the light of such names as Rossini, Bellini, Donizetti, Auber? How relatively to another of his countrymen—Hector Berlioz? Will not his fame occupy a space, undisputed indeed, but circumscribed in quality and extent? In his first and greatest work now under our notice, the last act contains the highest indications of strength of conception and unity of design. The air for the tenor in the fourth act would be a gem, we are bold to say, in any work. In the final scene there are gleams of real genius. The reckless levity of the opening chorus, broken off by a funeral march, which seems to breathe the very essence of persecution rather than of solemnity, and the penitential dirge, instinct with a sinister and fatal beauty, are instrumented with real originality, and are types of their kind. Between *La Juive* and *La Tempesta*, there is all the difference of freshness and exhaustion, of a labour of love and a "commission to order," executed with ambition, but *à contre-cœur*. A "labour of love:" for the composer of *La Juive* is one of that glorious but scattered race who even now rule the world by "notes," and whom a celebrated Caucasian protectionist delights to honour. May we not congratulate him on living in days when Jews are only burnt on the stage of the grand opera, and the worst of their persecutions is to knock at the door of the British House of Commons in vain.

Grisi sang the part of *Norma* for the last time on Tuesday; it is one of those parts so completely associated with this great artiste, that the very names might almost replace one the other; she continues to give it with all those attributes of the lyric art with which she is so eminently gifted,—beauty of voice and singing, grandeur of style, great pathos, and wonderful dramatic energy. Tamberlik makes as much of *Pollio* as any tenor we remember in it. Herr Formes is not a satisfactory *Oroveso*, his German style suits not the cantabile of Bellini, and his dragging-the-time propensity is very tiresome. Mlle. Vera could not be said to be more happy as *Adalgisa*, her acid kind of voice did not blend with Grisi's in the well-known duets.

Beethoven's *Fidelio* is spoken of as the last production of the season, which extends to the end of the month.

LITERARY NOVELTIES.

LIST OF NEW BOOKS.

Arnold's (Rev. T. K.) Athenian Stage, 12mo, cloth, 4s.
Bennett's (Rev. W. J. E.) Lives of the Fathers of the Church, vols. 1 and 2, each, 6s.
Bentham's (Brigadier General Sir S.) Suggestions for the better management of the Civil Concerns of the Navy, 8vo, cloth, 3s. 6d.
Bowman's (T.) Questions adapted to Hall's Elementary Atlas, 12mo, cloth, 2s.
Brown's Discourses and Sayings of our Lord Jesus Christ, 3 vols. 8vo, cloth, £1 11s. 6d.
Bryant's (W. C.) Poems, with Essay by Gilfillan, square, 4s.
Carlyle's (T.) Latter-Day Pamphlets, post 8vo, cloth, 9s.
Chalmers' (Dr.) Life, vol. 2, 8vo, cloth, 10s 6d.
Coleridge's Friend, 3 vols., new edition, cloth, 15s.
Cumming's (Dr.) The Voices of the Night, 12mo, cloth, 7s.
Dickenson's (R. W.) Religious Teaching by example, 12mo, sewed, 1s. 6d., cloth, 2s.
Douglas (J.) on the Structure of Prophecy, 8vo, cl., 3s. 6d.
Duff's (A.) Missionary Addresses, 12mo, cloth, 3s. 6d.
Elliot's (G.) Sermons on some of the subjects of the Day, 8vo, cloth, 9s.
Every-Day Wonders, 18mo, cloth, 2s. 6d.
Four Gospels Combined, 12mo, cloth, 4s. 6d. (roan, 6s.)
Gardener's Magazine, vol. 1, royal 8vo, 18s.
Gardiner's Music of Nature, third edition, royal 8vo, cl., 18s.
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In consequence of the meeting of the British Association, and the press of matter received from Edinburgh, the communications of some of our correspondents have not received attention. They are requested to accept our apology.

For the Remainder of our Intelligence, and the Report of the Proceedings of the British Association, see the Supplement to the Literary Gazette of this Day.

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The Right Hon. the LORD MAYOR in the chair,

For the purpose of considering the best measures for carrying out the resolutions of the Committee for Erecting to the Memory of His Royal Highness the late Duke of Cambridge a Monument commensurate with his exemplary virtues, and in remembrance of the munificence, untiring exertions, and unwonted self-denial of that good Prince in the cause of the public charities of the United Kingdom.

Proposed by the Right Hon. Lord Robert Grosvenor, M.P., seconded by Benj. Bond Cabbell, Esq., M.P.;

Resolved, That this Meeting deeply deplores the demise of His late Royal Highness the good Duke of Cambridge, a loss which must be felt as irreparable by the benevolent world; that among the many rare and noble virtues which distinguished that illustrious personage, the benignity of his disposition and affability of manner were strikingly conspicuous, endearing him to all who had the honour to approach him; that his conduct was equally characterized by the dignity of a Prince, and the unaffected humility of a Christian; whilst his whole life and fortune were devoted to the protection and affectionate care of the sick and the afflicted, more especially in instituting and upholding the varied and numberless charities of this metropolis. Anxious to pay a tribute due to great moral worth, this Meeting resolves on raising some permanent monument to the memory of the "good Duke of Cambridge," which, whilst it becomes a record of public sorrow at his death, of admiration and gratitude for his self-sacrifices in the cause of charity, shall serve as a guide and example to all who wish to become the benefactors of mankind.

Proposed by the Most Hon. the Marquis of Granby, M.P., and seconded by the Right Hon. the Earl of Talbot;

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Proposed by Richard Twining, Esq., jun., seconded by the Hon. Lieut.-Colonel Sir Edward Cust;

Resolved, That measures be taken to convene a public meeting, similar to the present, at Willis's Rooms, St. James's; that His Royal Highness the Prince Albert be respectfully requested to preside on the occasion; and that a deputation do wait on His Royal Highness to solicit that honour.

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14, Waterloo Place, 10th May, 1850.

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5000	1 year	.. ..	112 10 0	5112 10 0
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1000	1 year	.. ..	22 10 0	1022 10 0
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SUPPLEMENT TO THE LITERARY GAZETTE

BRITISH ASSOCIATION.

EDINBURGH, AUGUST 6TH AND 7TH.

THE Congress, we might almost say the Jubilee, is over; for the Scottish capital has again distinguished itself by a reception of boundless hospitality given to the British Association. From Granton Pier to the farthest limits of the city, there has been such breakfasting, lunching, dining, and supping, that Science has waxed fat in the midst of its most fatiguing and wasting labours. In short, the meeting has gone off in the best possible style and spirit, and a new and strong impulse has been afforded to the travelling parliament from its northern lights.

In a scientific point of view, also, the results have been highly satisfactory; for although there has been no extraordinary feature to distinguish the proceedings, they have been altogether of a useful and comprehensive description, and brought down the intelligence to the present time in a gratifying manner. The various branches of inquiry have been as it were tabulated for a resting place, whence we may set out on new discoveries, assured of our ground up to this starting-point. And herein lies a great good and benefit of these annual assemblages. They settle numerous matters which might otherwise employ ingenious persons in needless experiments, merely in consequence of not being aware of what had been already done, Our sheet will, we trust, contribute specially and largely to this desirable end, by circulating every important piece of information connected with this occasion, far and wide, at home and abroad. And in order to do so even more effectually than hitherto, we have, as we intimated, extended our bounds, and devoted separately and entirely to science a very considerable space, without encroaching upon the literary and other divisions of our Journal. By this means we are enabled to publish the most striking papers at full length, whilst we, at the same time, epitomize the rest sufficiently to furnish all the particulars which either the scientific reader, or the more popular world outside, could require.

In adopting this plan, it will appear that we could not go regularly on, beginning at the beginning, for the time and distance would not admit of that process; but we follow the course of things as nearly as we can, and select the most important and various for the edification of our friends. It will be seen that some of the most interesting questions of the present day have fallen within the scope of these discussions.

Our first paper is one of an eminently scientific order, and has excited the utmost attention in the Section of Physics, to which it belongs.

FARADAY AND PLUCKER.

Magneto-optic properties of Crystals, and the relation of Magnetism and Diamagnetism to Molecular Arrangement. By John Tyndell, Esq.

FOUR years ago, Mr. Faraday established the universality of magnetic action. He found that in relation to their deportment before the poles of a strong magnet, all known bodies fell into two great divisions; those of the one division being attracted by the magnetic poles, while those of the other division were repelled. The former he called magnetic, the latter diamagnetic bodies. Iron is an example of the one, bismuth is an example of the other.

If a body, suspended freely in the magnetic field, set its length from pole to pole, its position is called the axid; if at right angles to the line joining the poles, its position is called the equatorial. Iron, for example, sets axial; bismuth sets equatorial.

Connected with these results was the announcement of a beautiful relation between light and magnetism, discovered by Professor Plücker of Bonn, and published in Poggendorff's *Annalen* for 1847. The relation was expressed in the following two laws:—

"When any crystal whatever, with one optical axis, is brought between the poles of a magnet, the axis is repelled by each of the poles; and if the crystal possess two axes, each of these is repelled with the same force by the two poles.

"The force which causes this repulsion is independent of the magnetism or diamagnetism of the mass of the crystal; it decreases more slowly than the magnetic force proceeding from the poles."

Later inquiries induced Herr Plücker to alter his first law. A year ago he announced, in a letter to Mr. Faraday, that the optic axes of negative crystals alone were repelled, the axes of positive crystals being always *attracted*.

It is perhaps worth observing that, if the optic axis set itself axial, it is said to be attracted; if equatorial, it is said to be repelled.

The investigation, an abstract of which I have now the honour to read, was commenced last November by Professor Knoblauch, of the University of Marburg, and myself. Our apparatus was a stout electro-magnet, and our power generally from six to eight cells of Bunsen's battery.

After many weeks of perplexing and unsatisfactory experiment, during which we reduced the crystals examined to the shape of spheres, disks, and cubes, thus destroying the influence of mere form, and obtaining the pure action of the optic axis, we at length alighted on a crystal of calcareous spar, from which a disk was taken, the optic axis of the crystal being marked thereon as a diameter. On suspending the disk horizontally between the poles and exciting the magnet, the optic axis turned into the axial position. The experiment was repeated with other disks, and the result confirmed. Here, then, was a negative crystal, which apparently deviated from the law cited. No pains were spared to prove whether the exception was of a substantial nature or not. We collected a dozen specimens of the crystal from twelve distant localities, and the result was, that five of the crystals corroborated the law of Herr Plücker, while the remaining seven contradicted it.

On examination, it was found that the five crystals which set their optic axes equatorial were one and all *diamagnetic;* while the seven which set their axes axial, were all *magnetic*. On submitting them to chemical analysis, it was found that the five corroborating crystals were composed of pure carbonate of lime, while the seven contradictory crystals were composed of carbonate of lime, and a small quantity of carbonate of iron.

It must be borne in mind that the iron was not an extraneous ingredient, it formed part and parcel of the mass of the crystals. The two specimens, in short, were isomorphous, of the same optical properties, but chemically different.

Now, Herr Plücker, in expressing his revised law, had emphatically repeated the affirmation that the attraction and repulsion of the respective axes were wholly independent of the magnetism or diamagnetism of the mass of the crystal. But here, assuredly, is evidence sufficient to shake the credibility of this statement. We have before us twelve negative crystals, seven of which, in contradiction to the law, set their optic axes from pole to pole, and we further find that these particular seven, and these only, are magnetic. Beyond this there is no assignable reason why their deportment should differ from the others.

We have examined other crystals of the same form as calcareous spar—some magnetic, others diamagnetic. Nitrate of soda, breunnerite, dolomite, carbonate of iron, and oxide of iron, are examples. In all cases, the magnetic crystals of this form set their optic axes from pole to pole, while diamagnetic specimens set their axes equatorial. Further, the energy with which the optic axis takes up the axial position, varies with the quantity of magnetic matter which the crystal contains. When this is small, the action is weak; when considerable, as in the case of carbonate of iron, the action is energetic. These facts are at variance with the statement that the position of the optic axes is independent of magnetism or diamagnetism.

The law fails in the case of crystals with two axes also. We may here confine our attention to the line bisecting the acute angle inclosed by the optic axes: in positive crystals this line must stand axial, in negative crystals, equatorial. This, however, is by no means invariably the case—dichroite, sulphate of zinc, and sulphate of magnesia, are exceptions; they are all negative; the line aforesaid, nevertheless, sets itself in each case from pole to pole. Sugar is also an exception. The deportment of sulphate of barytes, a positive crystal, is very peculiar. Suspended from the sharp edge of the crystalline prism, the line bisecting the acute angle inclosed by the optic axes sets axial; suspended from the obtuse edge of the prism, the same line sets equatorial. Take it either way, therefore, assume the force attractive or assume it repulsive, it cannot be reconciled with the facts before us. Sulphate of strontia, also a positive crystal, behaves in a similar manner: suspended from one angle, it corroborates the law of Herr Plücker; suspended from the other angle, it contradicts that law.

The production of exceptions is perhaps the most convincing proof of the insufficiency of the law. It appears to us, however, that it would not bear examination *à priori*. Herr Plücker finds that a crystal of tourmaline, although magnetic, sets equatorial — that a crystal of bismuth, though diamagnetic, sets axial. In the former case, the attraction of the mass is said to be overcome by the superior repulsion of the optic axis; in the latter case, the repulsion of the mass is said to be overcome by the superior attraction of the optic axis. Here difficulties begin to thicken upon us. We have a repulsion of the tourmaline which is not exerted on the mass of the tourmaline, for the latter before a single pole is attracted; and we have an attraction of the bismuth not exerted on the mass of the bismuth, for the latter before a single pole is repelled. On what, then, are these new forces exerted? "On the optic axis," replies the law. What, then, is the optic axis? We confess we see here no escape from the assumption that the varied and complicated motions exhibited by crystals in the magnetic field are owing to the attraction and repulsion of certain millimetres of pure space.

Herr Plücker recommends the magnet as a sure and practical means of ascertaining whether crystals are positive or negative, and has published a list of crystals classified on this principle. The foregoing exceptions suggest the insecurity of the basis on which this classification rests. It is due, however, to Herr Plücker, to state that we have met a considerable number of crystals which seem completely to corroborate his views.

Mr. Faraday has devoted considerable time to the investigation of this intricate subject. The Bakerian lecture of the Royal Society for 1849 is entirely devoted to it. The inconsistencies we have pointed out must have been observed by him; for, though avowedly concurring with Herr Plücker, still, in explanation of his own experiments with bismuth crystals, he has thrown attraction and repulsion quite overboard, and made the force to consist merely in direction. "The force," says Mr. Faraday, "is due to that power of the particles which makes them cohere in regular order, and gives the mass its crystalline aggregation; which we call at times the attraction of aggregation, and speak of as acting at insensible distances." To explain the phenomena observed by him, Mr. Faraday deems it necessary to assume the existence of two new forces, which he respectively denominates the magne-crystallic force and the magneto-crystallic force. We have considered the nature of these forces more at length in another place; suffice it here to say, that the conception of a purely directive force, such as that assumed by Mr. Faraday, appears to be attended with insuperable difficulties in a mechanical point of view. And with regard to the part performed by the crystalline aggregation, it will be seen that precisely the same phenomena occur after that aggregation has been entirely destroyed.

We had not proceeded far in our inquiries ere we found that in certain amorphous bodies some particular line appeared always to stand axial or equatorial, as if the respective forces chose this line in preference to any other. This was peculiarly the case with a description of gutta percha of a fibrous structure. The substance was strongly magnetic; but notwithstanding this, it sometimes set itself like a diamagnetic body, with its longest dimension equatorial. This was always the case when the fibre was transverse to the length; the magnetic force appeared to act with peculiar energy in the direction of the fibre, and pulled it invariably into the axial line. Now this was evidently owing to some peculiar arrangement of the magnetic particles. Supposing the gutta percha to become suddenly diamagnetic, is it not reasonable to believe that the arrangement which caused the attraction of the fibre in the former case would now cause its repulsion? Let us apply this to the case of calcareous spar. If we suppose the attraction of the optic axis of the magnetic crystal to be owing to some peculiarity in the arrangement of its particles, it is natural to infer that the same arrangement would cause the repulsion of the said axis if the particles were diamagnetic. From this point of view the deportment of calcareous spar presents no great difficulty.

If the magnetic and diamagnetic forces or fluids be associated with the particles of matter, may we not infer that the nearer these particles are to each other, the less obstruction will be offered to the passage of the forces from particle to particle? And if in any body a direction exist in which the proximity of the particles is a maximum, may we not expect that this direction will signalize itself in the magnetic field something like the fibre of the gutta percha? We must remember that the resultant of magnetic action in these cases is very different from what we understand by a mechanical resultant. Let us suppose that in one direction through a magnetic body 1000 particles fit in the space of an inch, while in a direction at right angles to this 900 particles occupy the same space, each of these lines has a certain tendency to set itself from pole to pole, but the resultant will not lie between them. Magnetism chooses the line of closest proximity, and rejects all other lines.

Let any diamagnetic powder be taken—pounded bismuth, for instance—and mixed into a thick paste by the addition of a little gum water; a pressure between the fingers is sufficient to derange its apparent diamagnetic action. Place it on the back of a plate, and roll it out like a bit of pastry; a scrap cut from this, hung edgeways between the poles, will set itself from pole to pole. Place it within the jaws of a vice, and squeeze them fast, hang it edgeways up again, and send a current round the magnet; the plate thus hung will turn with the energy of a magnetic substance into the axial line, though its length may be ten times its thickness.

If the powder be magnetic—pounded carbonate of iron, for instance—and a plate prepared in the manner just described, such a plate suspended in the magnetic field will, on the development of the power, recoil from the poles as if suddenly repelled, and take up the equatorial position.

We observe the influence of proximity in each of these cases. The particles by compression are brought closer together. The bismuth sets axial, not by attraction, but by the repulsion of its line of closest proximity, and the carbonate of iron sets equatorial, not by repulsion, but by the attraction of its line of closest proximity. We encounter the same in some degree in all substances, for where the mass is not perfectly homogeneous, there will always be a preference shown to some particular direction. To this choosing of a certain line through the body by the respective forces we have given the name of elective polarity, and the line of closest proximity we have named the line of elective polarity; this line in magnetic bodies will stand axial, in diamagnetic equatorial.

The phenomena exhibited by crystals we believe to be a particular manifestation of this principle, and the term magne-crystallic axis, used by Mr. Faraday to express the line which sets with greatest force from pole to pole, coincides in magnetic crystals with the line of elective polarity, and in diamagnetic crystals is perpendicular thereto. This principle affords a fundamental explanation of all the phenomena observed. Take the case of calcareous spar. We hang it in the magnetic field, and observe its action. M. Plücker attributes this action to an optic axis force. We take the following measures to annihilate this force—Place the crystal in a mortar and pound it to powder, dissolve the powder in hydrochloric acid, and precipitate it again with carbonate of ammonia; dry the precipitate, and mix it into a paste with gum water as before, press it in one direction, and take from it a model of calcareous spar in which the line of compression represents the optic axis. Every single motion of the crystal will be imitated by the model, and every experiment that has been made with crystals can be imitated in a similar manner. There is no optic force here; there is no crystalline arrangement, for this has been destroyed; yet the phenomena are not to be distinguished from those exhibited by crystals. But elective polarity affords a sufficient explanation where the other theories entirely fail.

Hitherto we have occupied ourselves in considering the effects of proximity in crystals. In regard to the cause, two experiments will illustrate our views. If we suspend a crystal of sulphate of nickel from its end between the poles, and excite the magnet, a certain line will take up the axial position with considerable energy. If a knife-edge be laid upon this line, and pressed in the direction of the axis, the crystal will split before the edge, and reveal a clean plane of cleavage.

If we take a crystal of sulphate of zinc, or sulphate of magnesia, and suspend it similarly, a certain line will also take up the axial position. If we lay a knife-edge on this line, and press, we obtain no cleavage; but if we lay the edge upon a line at right angles to this, that is to say, equatorially, and press, we obtain a clean cleavage as before.

By this means the cleavages in these crystals are always discoverable. Now, they are of the same form and size, and each possesses but one cleavage. This, however, in the one stands axial, in the other equatorial. How is this? One sufficient reason appears to be at hand; sulphate of nickel is magnetic, sulphate of magnesia is diamagnetic.

May we not consider these crystals to be made up of laminæ indefinitely thin, placed side by side within the range of cohesion, but still not in absolute contact? From this point of view it is reasonable to infer that the magnetic laminæ will set themselves axial, and the diamagnetic equatorial. For the forces in crossing transverse to the laminæ would encounter the obstruction of the intervening spaces, whereas *along* the laminæ no such obstacle exists.

If we mix a little oxide of iron with gum water to the consistency of cream, and lay it like a strong wash of water-colour on thin paper, cut from this scraps an inch long and a quarter of an inch wide, and gum them together to form a parallelopiped, we have a model which behaves as the nickel crystal behaves, the layer of oxide representing the thin magnetic plate of the crystal, and the paper the space between two plates. If the model be formed by laying little squares one-sixteenth of an inch in area one upon the other until they reach the height of an inch, such a model, though strongly magnetic, will set itself equatorially with great energy: its layers will stand from pole to pole. Now this is exactly the case with beryl and other magnetic crystals which cleave perpendicular to their axes; their laminæ stand axial, and their axes equatorial. In this way the deportment of all crystals whose cleavages are not too complicated can be reproduced. If, instead of the magnetic oxide, the powder of bismuth be used, the deportment of diamagnetic crystals may be accurately imitated.

The primitive plates are, so to speak, differentials of which the crystal is the integral sum. If the crystal cleave in two directions at right angles to each other, then we have no longer plates but little bars, and if these be intersected by a third cleavage perpendicular to their length, our differential becomes a cube, as in rock-salt. We attribute the directive power of crystals mainly to the cleavages; hence, if these disappear, the directive power must vanish with them. This explains the fact observed by Mr. Faraday, that antimony and bismuth crystals lose their directive energy *just as they melt*. It also explains why the regular crystals have little or no directive energy, for here the cleavages annul each other.

In applying this cleavage hypothesis to crystal possessing three planes of cleavage, I shall limit myself to one example—that of calcareous spar.

It will be well, perhaps, first to introduce the case of an exceedingly thin rhombus, cloven from the spar. Looking down upon this we have before us, according to the hypothesis, an indefinite number of smaller rhombuses, held symmetrically together by the force of cohesion, and separated from each other by insensible intervals of cleavage. Let us confine our attention for the present to two rows of these small rhombuses, that along the greater diagonal and that along the less. Now, from the nature of the crystal, whatever be the number supposed to fit along the former, precisely the same number must fit along the latter, but here they are closer together, because the space is less. Calling the distance which separates two adjacent molecules on the long diagonal dx, and the distance which separates two adjacent molecules on the short diagonal dy, it is easy to prove that $\frac{dy}{dx}$ is very nearly equal $\frac{3}{4}$. We have, therefore, along the greater diagonal a row of molecules, the distance between each two being represented by the figure 4, and along the less diagonal a row, the distance between each two being represented by the figure 3. The short diagonal is therefore the line of closest proximity; in magnetic crystals it will stand axial, and in diamagnetic equatorial, which is exactly what the experiments exhibit. A slight effort of thought will transfer this reasoning to the full crystal; it will there be seen that the little component crystals stand most thickly together along the optic axis, which axis signalizes itself accordingly in the magnetic field.

We have thus arrived by a different route at the result established by Mitscherlich, in his beautiful investigations. He has found the optic axis of calcareous spar to be more expanded by heat than any other of the axes of the crystal, and hence makes the ingenious inference, that as the repulsion of the particles is increased by the addition of heat, the expansion must be greatest where the particles are ranged most closely together.

If the views advanced in this paper be correct, how valuable is magnetism as an investigator of the inner constitution of bodies. By it we are enabled to establish an order of contact among the atoms, to tell the direction in which they lie most closely together, and where they are most widely separated. The molecular arrangement of crystalline bodies is thus rendered transparent to the thought of the philosopher, and a flood of light is thrown upon the phenomena of polarization and double refraction.

If the optic axis force assumed by Herr Plücker, in his first law, be proved to have no existence, the second law, which depends upon the first, must give way also. It may nevertheless be of interest to look for a minute or two into the grounds of the statement, that the optic axis force decreases more slowly than the magnetic force.

The description of one experiment will illustrate the manner in which the conclusion was arrived at. A tourmaline crystal, three quarters of an inch long and one quarter across, suspended be-

tween a pair of pointed poles, placed so near each other that the crystal could barely swing between them, set itself axial; when the poles were withdrawn to a greater distance, the same crystal set equatorial. As a general rule, when the crystal was withdrawn from the immediate neighbourhood of the poles, it turned round from the axial into the equatorial position.

To account for this, Herr Plücker assumes that the optic axis repulsion decreases more slowly than the magnetic attraction. It follows from this, that at a certain distance from the poles, the repulsion must be triumphant, and the crystal must stand equatorial. A single experiment, however, would have been sufficient to prove that there was no repulsion present; for even when the mass is sufficiently distant to stand equatorial, if one pole be removed, it is attracted by the other.

This turning round admits of easy explanation. To clear the way for this, we shall make a few remarks beforehand. A little bar of soft iron suspended horizontally in the magnetic field will always set its length from pole to pole, and if removed from this position will return to it. Now, this is not due to any peculiar facility with which the iron is polarized in a longitudinal direction, but merely to the mechanical advantage afforded by its length. An attractive force acting on a particle at its extreme end, draws the bar round with a momentum expressed by the product of the force itself, and the distance of the particle from the axis of rotation. Now, the cleavages of tourmaline are such that the crystal is most readily polarized in a transverse direction. This transverse line will stand axial when the directive power of the crystal is developed, provided the length be not unduly great, for then the momentum spoken of might be considerable enough to effect a strained polarity, and to make the crystal stand oblique or perhaps axial. What is here brought about by inequality of dimension, may also be brought about by inequality of force. When we use pointed poles, we have a magnetic field of very unequal power. The points exercise a concentrated local action. The mass at the extreme ends of any crystal suspended in such a field is powerfully attracted, while the action on the central parts is comparatively weak; in this way a magnetic crystal, although its tendency may be to set equatorial, is pulled into the axial position. The directive force is not by any means equably and fully developed; for, take the self-same crystal, and suspend it between a pair of flat poles, you cannot, even though you should use a battery of fifty times the power, draw it into the axial line. Between the flat poles it is encompassed by the influence, and its whole directive energy is evoked. Now the points withdrawn to a distance have practically the same effect as the flat poles, for the force radiating from them has had time to diffuse itself, it encompasses the entire mass of the crystal, and the equatorial position is the consequence. Every action here described may be imitated by a bit of gutta percha or magnetic dough.

The entire case, then, may be thus summed up. We have on the one side four new forces assumed, the optic attractive force and the optic repulsive force, the magne-crystallic force and the magneto-crystallic force; and on the other side no new force whatever, but simply that modification of existing forces which we have named elective polarity. By attention to the compression of amorphous bodies, every single experiment cited in proof of the existence of these four forces can be reproduced. Exactly the same can be exhibited with wax, dough, artificial layers, gutta percha, and ivory. The alternative, then, appears to be, either to explain the action of these substances by the assumption of optic and crystalline forces, or to explain magne-crystallic action by elective polarity.

An interesting discussion ensued: Professor Thomson considering that the facts observed by Mr. Tyndall were in accordance with the theory of magnetic induction, and that Faraday was right in calling the force a directive action. Mr. Tyndall had the highest admiration for Faraday's experiments, but he differed from his views, and he thinks on good grounds; the experiments had been in operation during nine months, and upon a hundred natural, and a vast number of artificial, crystals.

To make the subject as complete as possible in our present number, we subjoin an abstract of Professor Thomson's remarks, and an abstract of his communication on the theory of magnetic induction.

Professor W. Thomson remarked that the principal experimental results described in the preceding communication appeared to be in full accordance with a Theory of Magnetic Induction he intended to bring forward in this section, before the close of the present meeting of the British Association. The remarkable phenomena observed in the experiments upon crystals of sulphate of barytes, when interpreted according to the theory referred to, indicated the existence of three principal axes of magnetic induction, with three different values of the inductive capacities corresponding to those directions. The appearance of a small cake of dough impregnated with powdered bismuth, exhibited by Mr. Tyndall, was considered by Mr. Thomson as confirming a suggestion that he had made, according to which the magnetic phenomena which it had presented in Mr. Tyndall's experiments, might possibly be due to an arrangement of the particles of bismuth, with a preponderance of axes perpendicular to the flat sides of the cake; but he admitted that such a supposition did not appear to be applicable to some other models exhibited by Mr. Tyndall. Without admitting the probability of the physical hypothesis adduced by Mr. Tyndall, and illustrated by the models which he exhibited, Mr. Thomson remarked that the views expressed by Mr. Tyndall, regarding the facts of magnetic induction in crystals, especially those indicated by the use he made of the term "axis of elective polarity," were in accordance with the theory alluded to above,—a theory, of which the first idea is due to a suggestion made by Poisson, in his original memoirs on the Mathematical Theory of Magnetism. Such an axis is directed either along or perpendicularly across the lines of force (according to conditions clearly defined in the theory), by the action of the magnetizing body upon the crystal magnetized by it. Hence the expressions, "directive action," "tendency to become parallel to the lines of force"—and the like, employed by Faraday, seem to be more natural and simple than those in which repulsion or attraction of the optic axes, or of the planes of cleavage, of a crystal occurs.

Faraday's law, that a small body of dia-magnetic substance, placed in the neighbourhood of a magnet, experiences a pressure urging it from places of stronger towards places of weaker force, extended so as to include the reverse action experienced by a ferro-magnetic body similarly situated, is confirmatory of the explanation given by Mr. Tyndall of the phenomena observed in experiments on the crystals of tourmaline; from which, and others of a similar kind, M. Plücker had inferred that "the optic axis force decreases less rapidly than the force of magnetic attraction;" and, in conclusion, Mr. Thomson expressed his conviction, that a full comprehension of the principles stated by Faraday in his paper on the magnetic condition of all matter, is sufficient to reconcile many apparently contradictory results obtained by different experimenters, and to avoid the necessity of some anomalous conclusions drawn by others, in this intricate subject of research.

Professor W. Thomson on the Theory of Magnetic Induction in Crystalline Substances.

Poisson, in his original memoirs on the Mathematical Theory of Magnetism, makes a suggestion regarding the possibility of certain magnetic properties being possessed by crystalline substances, but the phenomena that would result from them not having been observed by any experimenters at the time when he wrote, he excludes the hypothesis of their existence from his speculations on magnetic induction. Such phenomena have since been discovered by Plücker, and therefore it becomes an object of much interest and importance to follow out Poisson's suggestion. The hypothesis, however, on which Poisson's theory depends, that of two magnetic fluids existing in the supposed magnetic elements of matter, is now untenable; and a theory of magnetic induction in crystalline substances, founded on it, would not be satisfactory in the existing state of science. The author of this communication stated two principles, involving no physical hypothesis regarding the ultimate nature of magnetization, which he considered to be a sufficient foundation for a complete Theory of Magnetic Induction. One of these, which he called the principle of the superposition of magnetic inductions, cannot be considered as fully established by experience; but it is probably true, or approximately true, in a great variety of actual cases, especially those in which the capacity for magnetic induction is very feeble. The theory indicates with clearness and precision how any deviations from this principle, which experiment may point out, are to be taken account of. The author proceeded to point out some of the conclusions which may be drawn by mathematical reasoning from these two principles; and indicated the steps of a demonstration of the existence of three axes, at right angles to one another, in every crystalline substance, possessing certain symmetrical properties with reference to inductive magnetization, in virtue of which they may be called "principal axes of magnetic induction."

In conclusion the author remarked, that although on first reading a paper "On the Magneto-Optic Properties of Crystals," by Messrs. John Tyndall and Hermann Knoblauch, recently published in the Philosophical Magazine (July), he considered that there would be some difficulty in reconciling the views of these writers with his theory, yet the opportunity the British Association had afforded him of discussing some of the points of difference, gave him reason for hoping that a complete agreement would ultimately be established.

The next paper which we consider to be deserving of entire publication relates to the subject of the Patent Laws, which have long called loudly for reform, and which are most ably expounded, and kindly commented upon, by Professor Hancock, in the Statistical Section.

THE PATENT LAWS.

On the Cost of obtaining Patents of Invention in different Countries.

Gentlemen,—In this paper I propose to direct your attention to some statistical information respecting the cost of obtaining patents or brevets of invention in different countries, which I have arranged in the following tabular form.

The authorities on which I have relied for the figures that I have thus arranged are the publications of Messrs. Robertson and Co., and Messrs. Newton and Son, intended for the information of parties seeking to obtain patents; and the average cost stated in the table is the cost of obtaining a patent or brevet of invention when unopposed and passed without extra fees.

To guard against any supposition of this table being incomplete, from the omission of some European nations in the list of countries, it is right to mention that in Denmark there are no patent laws, properly so called; protection being afforded to inventions under the laws respecting copyright; and in Switzerland, the Hanseatic Towns, and Turkey, the goverments do not grant patents.

Countries.	Species of Patent of Invention.	Average cost. £	s.	d.
United Kingdom	Copyright of ornamental designs (under 2 Vic. c. 17, and 5 and 6 Vic. c. 100) for from 9 months to 3 years.	From 0	6	0
		to 4	11	6
United Kingdom	Copyright of design in configuration of articles of utility (under 6 and 7 Vic. c. 65) for 3 years.	From 11	11	6
		to 15	4	6
Bavaria	Patent for 5 years.	12	0	0
United States of America	Patent for 14 years for an American.	13	0	0
Bavaria	Patent for 10 years.	15	0	0
Prussia	.. 5, 6, or 8 years.	15	0	0
Sweden	.. 5 years.	15	0	0
Bavaria	.. 15 years.	20	0	0
Belgium	.. 5 years.	23	0	0
Austria	.. 5 years.	25	0	0
France	.. 5 years.	31	0	0
Belgium	.. 10 years.	37	0	0
Holland	.. 10 years.	37	0	0
Austria	.. 10 years.	45	0	0
Spain	.. 5 years.	50	0	0
France	.. 10 years.	52	0	0
Belgium	.. 15 years.	70	0	0
Holland	.. 15 years.	70	0	0
France	.. 15 years.	73	0	0
Austria	.. 15 years.	75	0	0
Scotland	.. 14 years.	75	0	0
United States of America	Patent for 14 years for any foreigner except a British subject.	77	10	0
Russia	Patent for 1 to 6 years.	From 20	0	0
		to 80	0	0
England	.. 14 years.	110	0	0
United States of America	Patent for 14 years for a British subject.	120	0	0
Ireland	Patent for 14 years.	135	0	0
United Kingdom, including British Colonies, and including specifications.	Patent for 14 years.	376	0	0

When we examine this table, the points which suggest themselves as most worthy of notice are the following:—1st. That the cost of obtaining copyright for ornamental designs, or designs in the configuration of articles of utility in the United Kingdom, under our recent legislation, is less than the cost of obtaining similar privileges in any other country. 2nd. That the cost of obtaining a patent in England is greater than in any other European state. 3rd. That the cost of obtaining a patent in Ireland is greater than in any country in the world. 4th. That the cost of obtaining a patent for the entire British dominions is more than three times the cost of a similar privilege in any other collection of territories under one government.

From these results we are naturally led to the inquiry whether there is any good reason for maintaining in the British dominions the extraordinary high cost of obtaining patents, which is thus shown to exist; and whether this cost can be diminished without any injury to the community. For the purpose of conducting this inquiry I propose to direct your attention to the consideration of the following questions:—1. Should separate patents be required for each portion of the United Kingdom? 2. Is the expense of English patents caused by wise arrangements for affording to the public facilities for searching for previous inventions? 3. Is the great expense of British patents caused by arrangements for affording security to the inventor in the enjoyment of his property? 4. From what causes does the great expense of British patents arise? 5. What are the benefits which patents of invention confer on the community? 6. By what means can the cost of obtaining British patents be diminished?

To proceed, then, with the first question. Should separate patents be required for each portion of the United Kingdom? This extraordinary provision of our patent laws took its rise from the circumstance that the act of Parliament under which her Majesty grants patents was passed in the reign of King James the First, at a time when Scotland and Ireland were separate kingdoms, having perfectly distinct governments. The privilege of granting patents secured to the Crown by the act of James, was always exercised by granting letters patent under the Great Seal; and as there was a separate Great Seal for England, for Scotland, and for Ireland, separate letters patent became necessary. At the time of the union between Scotland and England, although the Parliaments were united, the Great Seals were kept separate, and hence there is a Lord Keeper of the Great Seal of Scotland, and a Lord Chancellor, or Lord Keeper of the Great Seal of England. At the Irish union, in like manner, the Irish Parliament was discontinued, but the Great Seal of Ireland was preserved in the custody of the Lord Cnancellor of Ireland.

So that at the present day an inventor has to get three patents instead of one, because the mode of granting this important privilege has been by letters under the Great Seal; and because, for reasons not at all connected with inventions, there are three Great Seals instead of one. The greater part of the documents that are issued under the Great Seal are of a local character, and with regard to them it may be convenient to have them enrolled in the portion of the kingdom to which they relate; but inventions are of an imperial character, and the convenience, both of the public and of inventors, would be best served by having one office for enrolment, or registration, of inventions. This is shown by the policy on which the recent acts are framed for granting copyright for ornamental designs, and designs of configuration. Under these acts one registration in one office in London confers the privilege for the three kingdoms.

By extending the principle thus sanctioned by the legislature, in two important instances, to all inventions for which patents are now granted, the cost of obtaining a complete privilege of invention for the entire United Kingdom would be at once reduced from £376 to at least one third of that amount, and the greatest anomaly in our patent laws would be removed.

Having thus disposed of the first question, we have next to consider whether the expense of English patents is caused by wise arrangements for affording to the public facilities for searching for previous inventions. In examining this question, I will confine your attention to the patent for England, which is the one most commonly taken out, and which costs £110.

The importance of having inventions registered in the way to afford the greatest facilities to the public for searching for previous inventions, is manifest from the very principle on which every patent of invention is granted, namely, that of securing to the inventor a reward for his ability and industry, in consideration of securing to the public the fullest disclosure of the invention; and so strictly is this principle enforced in our laws, that unless the enrolled specification contains a full disclosure, the patent will be cancelled. But what is the use of this disclosure unless the public have free access to the enrolled specifications? So that, from the very principle on which patents of invention are granted, it follows that the public ought to have the most complete and simple means of searching for inventions. The obvious way of securing this would be to have one office where all inventions should be registered. And now we come to consider the method adopted in England, in order to see whether, in the excellence of the arrangements on this essential point, there is any return for the great cost of English patents.

I find it stated that "there are in London three different offices in which the specifications of English patents may be legally enrolled—namely, the Rolls Chapel Office, which contains the records from a very early date; the Inrolment Office; and the Petty Bag Office." Now, when it is borne in mind that the sole object for which enrolments are made is to afford means of search, it is not easy to conceive anything more absurd than to have three offices for enrolment, so as to impose on the public three searches instead of one. As to the form of enrolment, it is unnecessary in this paper to say much. The best way of testing the English system is by the facilities it affords to those anxious to ascertain whether a discovery be really new or not, and on this point I may quote the opinion of an experienced patent agent, who states "that it is always a very difficult thing to determine by search whether an invention has been patented before or not." So that, in answer to the second question, we find that the expense of English patents is not caused by wise arrangements for affording to the public facilities for searching for previous inventions. We have next to consider the third question: Is the great expense of British Patents caused by arrangements for affording security to the inventor in the enjoyment of his property?

The whole process of granting a patent in England, Ireland, or Scotland, amounts simply to conferring a certificate of registration of the date of the sealing of the patent. For the inventor takes out the patent entirely at his own risk; there is no previous decision on his right to property in the invention. The true nature of a patent, in this respect, is put forward in the usual report of the Attorney, or Solicitor-General, on the reference previous to the issue of the patent, as the grounds for granting it, on the mere declaration of the inventor. Thus the common form of report of one of the law officers, after stating the reference of the petition, and the declaration of the inventor, proceeds thus: "Upon consideration whereof, and as it is entirely at the hazard of the petitioner, whether the invention is new, or will have the desired success, &c., I am humbly of opinion that your Majesty may, by your royal letters, &c., grant to the petitioner the sole use of his invention, &c."

So that the granting of a patent does not afford any security beyond what would be afforded by the simple issue of a certificate of registration at the risk of the inventor, and the great expense of British patents is not caused by any arrangements for affording security to the inventor in the enjoyment of his property.

Having thus shown that the cost of obtaining British patents does not arise from any arrangements for the benefit of the public, or of the inventor, we are naturally led to the fourth question—

From what causes does the great expense of British patents arise?

A very slight investigation of the subject will show that there are three distinct causes of this expense.

1st, The prolix and complicated forms of procedure for obtaining patents.

2nd, The fees to the Attorney-General, and other public officers, on these forms of procedure.

3rd, The stamp-duties on patents, and on the specifications required from patentees.

As to the forms of procedure: the inventor has first to make a declaration before a master in chancery, then to present a petition to her Majesty. This petition is referred by the Secretary for the Home Department to the Attorney or Solicitor-General. He makes a report in the common form I have referred to. Then there is a warrant from her Majesty, signed by the Secretary for the Home Department, to the Attorney or Solicitor-General, to prepare the letters-patent. Then the letters-patent have to go through a number of officers, until they are finally sealed by the Lord Chancellor.

All these forms of procedure, and the fees consequent on them, do not arise from any statute, but from custom and immemorial usage. They had a very natural origin in the jealousy with which patents of invention were looked upon at the time of the passing of the famous statute of monopolies (21 James I. c. 3,) which put an end to the abuses of the prerogative of the crown, which had taken place in previous reigns, by limiting patents to new inventions. But at the present day, when there is no danger of the prerogative of the crown being abused, when patents of invention are mere certificates of registration, it seems very unwise to require the intervention of a master in chancery, a secre-

tary of state, an attorney-general, and a lord chancellor, to the issue of such a simple document. The whole business could be better transacted, without complication, trouble, or delay, by one public officer, just as the certificates of registration of designs are now granted by the registrar of designs.

The second cause of the great expense of British patents arises from the fees paid to certain public officers on the different forms of procedure. Thus the Attorney-General receives a handsome fee for putting his name to a mere form, and there is a list of minor officers who each receive a fee on every patent. The general policy of paying public officers by salary, and not by fees, has been recognised and carried out to some extent in most departments of the state, but the fees of minor officials have in many cases remained untouched.

If the different officers to whom these fees are paid are not otherwise adequately remunerated for the services which they perform for her Majesty, they should be paid directly out of the general taxes. It seems a roundabout way to provide her Majesty with legal advice by a tax on the inventive genius of the community.

The third cause of the expense of British patents is the tax levied upon them in the shape of stamp duty on the patent and on the specifications.

As to the policy of this tax it is opposed to two of Adam Smith's maxims of taxation—it is unequal, and it is imposed at the time most inconvenient for the inventor to pay it. The tax on the specification is 5*l.* for the first skin of parchment, and 1*l.* for every subsequent skin, so that for specifications of equal length the tax is the same, no matter what may be the value of the invention or the income which the inventor derives from the patent. The most perfect system of taxation on this subject would be to follow the example of Prussia, and exempt the registration of inventions from taxation, and then, by a complete and perfect income-tax, to make the inventor pay his fair share for any income that he derived from the patent.

But the tax on inventions is imposed at the time that it is most inconvenient to the inventor to pay it—namely, at the first moment of invention, before he can by possibility have derived any profit from it. On this point, too, we may take a lesson from other European nations. In Belgium there is only a very small portion of the tax paid at once, from 50 to 100 francs, and the rest of the tax is allowed to remain unpaid for two years, and should the invention turn out unprofitable in that time, need never be paid.

In France, the greater part of the tax has only to be paid annually during the continuance of the patent, so that should the invention at any time turn out unprofitable, the payment of the remainder of the tax may be avoided.

Having shown that the great expense of British patents really arises from prolix, complicated, and unnecessary forms of procedure, from fees to public officers, and from taxation, I proceed to the consideration of the fifth question—What are the benefits which patents of invention confer on the community. The most obvious benefit is that of encouraging inventive genius by giving parties a fair reward for their labours, and by supporting them during their exertions.

The next obvious benefit is to secure a complete disclosure of all the discoveries that inventors think it desirable to obtain a patent for. Whenever the great cost of obtaining a patent prevents its being taken out, this benefit is to a great extent lost to the community, and hence the impolicy of any tax or unnecessary burden on the registration of inventions, or, in other words, on the means of securing their disclosure.

There is a third benefit which is very commonly overlooked—namely, that of economizing the use of the inventive genius of the community. Where patents are not granted, parties seek to protect themselves by secreting any invention they may discover, and a great part of their time is spent in trying to sell the results of their inventions without disclosing the process. Those who pirate inventions, on the other hand, under such a system take the result and endeavour to re-discover the secret process by which that result is produced—in other words, endeavour to re-discover what is already known. Under a perfect system of registration, parties would disclose their inventions without resorting to secresy, and other parties, instead of wasting their time in re-discoveries, would have an opportunity of learning, and would be compelled to learn what was already known, and thus would be forced to exercise their inventive genius in new discoveries.

So that a perfect system of registration of inventions, with a privilege of exclusive property, secures the most economic use of that most precious of human gifts, inventive genius.

From the consideration of the benefits arising from property in inventions, it follows that, so far from any impediment being placed in their way, every encouragement ought to be given to obtain them. And this consideration brings me to the last question—By what means can the cost of obtaining British patents be diminished?

From what has been already said, it is obvious that the cost of obtaining British patents can be readily reduced.

1st. By having only one patent or certificate of registration for the United Kingdom.

2nd. By adopting for all inventions the simple forms of granting certificates of registration now used with respect to ornamental designs and designs of configuration; and so rendering unnecessary the prolix and complicated forms now required in obtaining patents.

3rd. By substituting with respect to all inventions, the moderate fees and stamps of registration of designs, for the official fees and stamps on patents.

Were these changes adopted—and they are changes at once conformable to the policy of recent legislation on the subject, and to the teachings of common sense—the cost of obtaining a patent or privilege of property in inventions, for the entire British dominions, would be at once reduced from 376*l.* to 15*l.*; and Great Britain, instead of being inferior to every other country in this important branch of human legislation, would occupy her natural position in showing the greatest care for the most noble and valuable species of human property.

Taking a subject of yet greater commercial and national consequence, Mr. Porter, of the Board of Trade, read the following paper on the Cotton Trade and Manufacture in Great Britain:—

Cotton Trade and Manufacture.

THE fear of being dependent upon foreign countries for the supply of any article of first necessity has often influenced the mind of the public, although the cases can be but very few in which that fear can have any just foundation. It must be evident, upon the slightest reflection, that if the industry and capital of any country have been applied to the production of any article, the market for which is habitually found in some other country, it must be at least as disastrous for the producing country to be deprived of its market, as it could possibly be for the consuming country to have its supplies cut off. In point of fact, both countries would necessarily be placed by the interruption in the same condition of distress, since to be in a condition to deal together, both must be producing and both consuming countries. Put the case of two countries, A and B—A producing metal, and B producing clothing materials. A raises and prepares a larger quantity of metals than is needed for its own use, and exports one-half to B, in order to purchase cloth. B manufactures more cloth than is needed for home use, in order to purchase with the surplus, metals of A. Any stoppage of this intercourse must be alike injurious to both. Either they cease respectively to produce metals and cloth, and thus throw many persons in both countries out of work, or they produce more of the respective articles than can be taken off by the ordinary channels, and must accept lower prices, in order to open new channels of demand—an effect which will be hurtful to all persons engaged in the respective branches of industry. It cannot be necessary to pursue this inquiry further, in order to show the mutual dependence that exists between the two countries, and the evils that must follow from any interruption to their accustomed intercourse.

Notwithstanding what has been here said, there are, however, circumstances under which it may be unwise for a country to be willingly dependent upon another for the means of setting its industry in motion, viz., when the causes of interruption that will operate injuriously are beyond the control of the country of supply; and such a case actually exists in respect of the (to us) all-important article, cotton. Great Britain now is, and for many years has been, dependent not at all upon the good will of the citizens of the United States to sell their produce to us, but very much upon the influences of seasons, for the means of setting to work that large proportion of its population which depends upon the cotton manufacture for feeding themselves and their families. In the present condition of our cotton trade, any serious falling off in the amount of the cotton crop in the United States necessarily abridges the means of labouring among our Lancashire and Lanarkshire spinners and weavers. Such a falling off is in any year likely to occur. We have felt its influence twice within the last few years, are at this time suffering under it, and are threatened with another adverse season, the effect of which must be to deprive of employment a large proportion of those spinners and weavers whose labour is bestowed in the preparation of coarse goods, it being in that class of manufactures that the price of the raw material first and principally shows its effects.

There is a growing opinion, that now, and for some few years past, we have reached the maximum supply of cotton from the United States, a fact which, should it prove correct, makes it a matter of absolute necessity either to seek for further supplies of the article from other sources, or to find some efficient substitute that shall provide the means of employment for our constantly growing numbers. From the peculiar nature of cotton, and other textile manufactures, it arises, that a considerable proportion of the hands which they employ consists of children and young persons, their proportion being, in some branches of the manufacture, as four to one of the adults employed. A part of these young persons betake themselves, as they grow up, to other employments, but, making due allowance for these, it will be found that a continual augmentation of the number of adults seeking employment in our mills is experienced, so that a very few years has hitherto sufficed for the doubling of that number. Hitherto the growth of the trade, and the constantly increasing supply of American cotton, have enabled this doubling to go forward, and there is but small reason to fear that the growth of the trade will in future be checked, unless it be so through a failure in the supply of the raw material. Any erious doubt upon this point may, however, we cause great anxiety.

Our supply of cotton has hitherto been drawn in very fluctuating proportions from British India, Brazil, Egypt, our West India Colonies, and the United States of America. From this last-named country the quantities were for a long series of years in a continual condition of increase. From Brazil our importations have sensibly lessened, without any reasonable prospect of future increase. From Egypt the quantities fluctuate violently, and depend greatly upon causes not falling within ordinary commercial considerations. In the British West Indies, the cultivation of cotton has for some

time ceased to form a regular branch of industry, and it is hardly to be expected that, having thus ceased to be profitable when prices in Europe were uniformly at a higher level than they have been for now a long series of years, the cultivation of cotton, to any important extent, will be resumed in these colonies. From British India the quantities received depend upon a different set of circumstances, but of such a nature as to forbid any very sanguine hope of great and permanent increase in the shipments. That cotton can be, and indeed that it is, produced at a low cost in British India is well known, and that its quality, when carefully collected and free from dirt, is sufficiently good for many, if not for most purposes of manufacture, is true also; that its price in the markets of Europe is uniformly lower than that of the more ordinary kinds of American cotton is owing mainly, if not wholly, to want of care, or of honesty, in those by whom it is packed for shipment, and who manage to forward with it to Europe a large per-centage of dirt and rubbish. This is an evil which it is manifestly within the power of the Indian dealers to remedy, and it is difficult to understand that a view to their own interest has not, long ago, led them to reform their practice in this particular. A want of practicable roads has been alleged as one chief reason why the cotton planters of India cannot compete successfully with those of the United States, but this evil can hardly be said to exist as regards the greater part of the East India cotton which hitherto has been exported to Europe, since it is produced within a very short distance of shipping ports to which the access is easy. Dr. Forbes Royle, who has deeply investigated all the circumstances attendant upon a supply of cotton from India, and than whom there cannot be a better authority, is of opinion that by bringing the native cultivator in India into nearer connexion with the consumer, through the personal intervention of Europeans, who would purchase from him direct and ship the produce to Europe, thus rendering unnecessary the intermediate speculators and dealers who now engage in the trade, and who will seek, either fairly or unfairly, to realize profits from their dealings, he (the cultivator) might receive a better price for his cotton, and would thus be induced to bestow greater care in picking and keeping it clean, and would be willing to devote a greater proportion than now of his land and his industry for the production of an article which he could then be certain to convert into the means of support for himself and his family, a result which, under the existing system, is very far from being the case, so that, as a measure of the commonest prudence, or, more correctly speaking, through necessity, he is forced to devote a large part of his land to the production of grain for the consumption of his household.

To realize the benefit thus suggested by Dr. Royle, there needs to be introduced into practice in India a new system, and no one who has any acquaintance with the habits of the people of that country needs to be told, how difficult a matter it must be to accomplish this, or indeed any change among them. While the price of cotton is high, through a partial failure of the crop in America, the consumers in Lancashire might be willing to give encouragement to any properly qualified persons who should proceed to India, with a view to the purchase and exportation thence of cotton in an improved condition, but the arrangements necessary for carrying out such a plan of operations would absorb much time, and, before any result could be attained, the whole state of things might be changed, through the gathering of an abundant crop in the United States, and the means that would thus be presented of obtaining thence a sufficiency of the raw material, at a moderate price. It must prove, therefore, more or less a hazardous speculation for any one to establish himself in Guzerat, with the object of supplying to any extent the markets of this country with cotton. By degrees, the desired result may possibly be realized, but if the cotton manufacture of England is to continue its usual rate of progress, the pace at which such a reform must proceed would be far too slow for it to exercise any sensible effect upon the condition of our manufacturing population.

Any direct encouragement to increased cultivation on the part of government by means of bounties or differential duties is, of course, quite out of the question.

The crop of cotton in each of the fifteen years from 1834-5 to 1848-9 in the United States, stated in bags, was as follows:—

1834-5,	1,254,328	1842-3,	2,378,875
1835-6,	1,367,225	1843-4,	2,030,409
1836-7,	1,422,930	1844-5,	2,394,503
1837-8,	1,801,497	1845-6,	2,100,537
1838-9,	1,360,532	1846-7,	1,778,651
1839-40,	2,177,835	1847-8,	2,347,634
1840-1,	1,634,945	1848-9,	2,728,596
1841-2,	1,684,211		

According to the accounts hitherto received, the crop of the season 1849-50 will fall short of that of the preceding season by about 700,000 bags, but will then be full 600,000 bags greater than the average crop of the five years 1834-5 to 1838-9, while it will be fully equal to the average of the following five years, and only 270,000 bags less than the average of the five years from 1844-5 to 1848-9.

The growth of the cotton manufacture in this country will be shown by the following statement of the weight of the raw material used in different years of the present century, viz:—

	lbs.		lbs.
1800,	56,010,732	1835,	363,702,963
1805,	59,682,406	1840,	592,488,000
1810,	132,488,935	1845,	721,979,953
1815,	99,306,343	1846,	442,759,336
1820,	151,672,655	1847,	474,707,615
1825,	228,005,291	1848,	713,020,161
1830,	263,961,452	1849,	775,469,008

The increased consumption of our cotton mills in each decennary period of this century is thus seen to have been as follows:—

		lbs.
1800		56,010,732
Increase to	1810,	76,478,203
Further ,,	1820,	19,183,720
,, ,,	1830,	112,288,797
,, ,,	1840,	328,526,548
,, ,,	1849,	182,981,008
Consumption in 1849...lbs.		775,469,008

It is by no means improbable that the consumption during the last nine years would have gone forward at a constantly accelerated pace, so that it would by this time have gone beyond 1000 millions of pounds weight in the year, but for the check given to it in 1847 and in the present year through insufficiency in the supply of the raw material. Notwithstanding this check, the growth of the cotton manufacture of England has been great beyond all precedent in analogous cases, and beyond all reasonable calculation, showing the astonishing increase in half a century of 1284 per cent. This increase has been concurrent with, and mainly caused by, a continual reduction in the price of cotton, which of late years has not been more than from one-fifth to one-fourth of the price at the beginning of the century. On the other hand, the continual fall in price has acted as a stimulus on the producers, who have hitherto made up in general by the extent of their cultivation for the diminished price of their crops. To this result there must of course be a limit, and it is more than probable that such limit, if not already reached, will be so sooner than the desire of mankind for cheap clothing will be satisfied. Cheap as cotton fabrics have of late years become, there can be no doubt that any further sensible diminution of their cost would create a new and very large circle of consumers among those who have hitherto been unable fully to gratify their wants in respect to the use of decent clothing.

The way in which consumption is treading on the heels of production, during a period of comfort for the people arising through cheapness of food, is clearly shown by the fact, that although the importation of cotton into this country in 1849 was the largest ever known, the comparatively short crop of the present season has had the effect of raising the market price of the material more than 55 per cent. above the prices of this period of 1849, and to an equal extent above the prices of 1846, when the American cotton crop was about equal to the estimate that has been formed for the present season.

To those who reflect seriously upon these facts, it must appear a matter of grave importance how any continued failure of cotton crops is to be met, and not only so, but also how a substitute is to be found for the hitherto constantly increasing amount of those crops, for it will not be enough to provide the same amount of employment as before for our continually growing numbers in a branch of industry, which by its ordinary operations necessarily brings forward those increased numbers. The uneasiness which it is natural to feel under the circumstances here described, has led to the inquiry as diligently and as carefully as opportunity has allowed, whether some substitute or auxiliary may not be called into action which shall meet the evil that threatens us, and this it is suggested may be found in a kindred branch of manufacture—that of flax.

A very few years ago, when first anxiety began to arise concerning the prospects of our cotton manufacture, the resource which has just been named did not present itself. At that time, our linen manufacture had not made the progress by which it is at present marked—a progress proportionally equal to any that has been made at any time in the cotton manufacture.

If we compare the prices of linen in 1832, when the home market was secured to the manufacturer by import duties equal to 40 per cent. on the value, and in which year the bounties which had long been granted on the exportation of British linens finally ceased with the prices in 1849, we find the following remarkable result:—

	1832.		1849.		
	s.	*d.*	*s.*	*d.*	
The same quality sold for	1	4	0	8¼	per yard.
,,	1	6	0	9¼	,,
,,	1	8	0	10¼	,,
,,	1	10	0	11¼	,,
,,	2	0	1	0½	,,
,,	2	2	1	2	,,
,,	2	5	1	3½	,,

showing a reduction of cost amounting to nearly fifty per cent.

The making of cambric handkerchiefs in Ireland is quite a modern branch of industry. The following list exhibits the comparative prices per dozen in 1833, 1838, and 1848 of handkerchiefs of the same qualities:—

1833.		1838.		1848.	
s.	*d.*	*s.*	*d.*	*s.*	*d.*
8	3	7	0	2	10
9	3	7	9	3	2
10	3	8	3	3	6
11	6	9	0	4	0
12	9	10	0	4	6
14	3	11	6	5	2
16	3	14	0	6	0
18	9	15	6	7	3
21	3	17	0	8	9
24	0	19	0	10	6
27	6	22	6	12	6
31	0	25	0	15	0
35	0	28	0	18	0

showing a reduction in the cost during 15 years of about 60 per cent., and in the last 10 years of 47 per cent. on the average of all qualities.

During the five years between 1844 and 1849, the reduction in the cost of 5-8 cambric handkerchiefs has been as follows:—

1844.		1849.	
s.	*d.*	*s.*	*d.*
14	6	11	0
16	0	12	0
17	6	13	0
19	0	14	3
20	6	15	6
22	0	16	9
23	6	18	0
25	0	19	6
27	0	21	0
29	0	22	6
31	0	24	0
33	0	25	6
35	0	27	6
38	0	29	6
41	0	32	0

This economy has been mainly effected in the spinning processes. A bundle (60,000 yards) of No. 40's line-yarn, the cost of which in 1839 was 11s., was reduced in 1848 to 4s. 3d., or from 2s. 2d. to 10d. per lb.—more than 60 per cent. During the same period, the fall in the price of cotton yarn of about the same quality has not quite amounted to 20 per cent. Since 1848, a rise in the price of flax has occasioned a corresponding advance in the price of yarn, and that which could then be bought for 10d. per lb. is now quoted at 12½d.

Hitherto we have in this kingdom been greatly dependent upon our foreign importations for supplies of flax, and while the law imposed restrictions upon the importation of grain for human food, there existed a kind of moral impediment in the way of increasing our home growth of articles for any purpose not of equal primary necessity. That impediment is now removed, and there can be no reason given why our fields should not be henceforth used for the production of any article that promises an adequate profit to the farmer. It is especially desirable so to apply the productive power of the soil for the supply of articles as indispensable to the support of millions of our people as corn itself, and an additional inducement to the growth of flax, beyond that offered by other articles, may be found in the fact, that to bring it to the same condition as that in which it is usually imported from foreign countries, calls for the employment of a considerable amount of human labour. There is no part of the United Kingdom in which the flax plant cannot be successfully cultivated, and there is hardly any country whence it might not be brought to supply our deficiencies, should such arise. It grows and flourishes equally in the climate of Russia and in that of India. In Ireland a somewhat sustained effort has been made by "The Royal Society for the Promotion and Improvement of the Growth of Flax," to induce proprietors in that country to devote a portion of their land to its cultivation, and it is understood that in the present year a larger breadth has been sown with flax seed in Ireland, than in any former year. Great improvements in the processes employed for dressing the fibre are also now in course of adoption, and it is perhaps not taking too sanguine a view of the result of these efforts to believe, that the reduction in the cost of the material and in the expenses of the processes needful for its manufacture, will, for some time, go forward in at least as satisfactory a degree as we have seen to have been already realized.

We cannot determine the growth of the linen manufacture by the same test which satisfactorily shows that of the cotton manufacture—viz., the quantity of raw material imported, since a part of the flax—in what proportion there are no means of showing—is produced from our own soil; but it will be evident, from the following figures, that a very rapid extension has been effected.

The quantity of foreign flax imported for use in the United Kingdom in each year, from 1831 to 1849, has been as follows:—

	Cwts.		Cwts.
1831,	936,411	1841,	1,346,843
1832,	982,516	1842,	1,145,759
1833,	1,129,632	1843,	1,437,150
1834,	811,722	1844,	1,583,494
1835,	740,814	1845,	1,418,323
1836,	1,529,116	1846,	1,147,092
1837,	1,000,865	1847,	1,052,089
1838,	1,626,276	1848,	1,463,661
1839,	1,223,701	1849,	1,806,786
1840,	1,253,240		

It should not, in any degree, interfere with the prosperity of the present race of cotton manufacturers, if flax were to be substituted in part for the material now employed by them. Some changes are, doubtless, necessary, in order to adapt their present machinery for the spinning of flax, but not to any important extent, and the expense to which the proprietors might thus be subjected, would be well compensated during the first year of short supply of cotton that might arise, by the security that they would feel in the future regularity of their operations, assured, as they then would be, against the irregularity of seasons, or those disturbances which have arisen, and which always may arise, to disarrange their operations and to interfere with the regular employment of their hands. It would not appear difficult so to order the arrangements of a spinning-mill or a weaving-shed, that both flax and cotton might be included within its operations, and that the preponderance in those operations might be given, from time to time, either to the one or to the other, according to the capabilities of the markets of supply on the one hand, and the requirements of the markets of consumption on the other.

Goods are now woven in which both materials are employed. This description of cloth was produced in the looms of Flanders more than 400 years ago. Two centuries later, such mixed goods were made in this country, the cotton employed in the same being imported from Cyprus and Smyrna; it was not indeed till 1772, only seventy-eight years ago, that goods were made in England, the whole material of which was cotton. The progressive reduction in price of this material, so much greater than that which, until a comparatively recent period, has attended the manufactures of flax, has hitherto caused the wonderful extension that we have witnessed in our cotton trade, an extension which has added most materially to the comfort of the labouring classes in this and other countries. So long as we could look with any degree of security to the continuance of this state of things, there could be no good reason for suggesting any change in our manufacturing arrangements; but now that a check seems to be given to the progress of the cotton trade, through uncertainty in the amount of the supply obtainable, whether by reason of untoward seasons, or through the employment of constantly greater quantities of the material in the principal country of production, the old state of things is so far changed as to render it a matter of national importance to provide the means for meeting the difficulties thus presented, and it may be considered a very happy circumstance that those means are not far to seek, but that, through the adoption of some previous changes in the most strictly analogous branch of industry, the adoption of a remedy is rendered comparatively easy.

It must be satisfactory for us, in a high degree, to know that the reductions mentioned in the cost of our linen manufactures have not been accompanied with any distress on the part of the spinners and weavers, nor of loss among the manufacturers, but, on the contrary, that during the period in question, the linen trade has been extended to a degree unexampled in its previous history, affording greater and more profitable employment to every one engaged in it. An accurate judgment may be formed upon the progress of the trade by ascertaining the extent at different periods of our exports. In 1832, we sent to our colonies and to foreign countries, 49,531,057 yards of linen, valued at 1,716,084*l.* In 1838, our exports reached 77,195,894 yards, valued at 2,717,979*l.*; in 1844, we exported 91,283,754 yards, valued at 2,801,609*l.*; and in 1849, the exports reached 106,889,558 yards, while the declared value amounted to 3,073,903*l.* During the same period our shipments to foreign countries of linen-yarn have advanced in value from 8705*l.* in 1832, to 737,650*l.* in 1849.

It must not be for a moment imagined that this subject is brought before the Section with any desire of fostering or encouraging one branch of manufacture at the expense of any other. The object in view is, in fact, the very opposite to such a desire, and springs from the wish to preserve, in its condition of prosperity and progress, one of the chief sources of employment for our continually growing numbers, without in any way interfering with any other branch of industry. It is hoped that the means here indicated may be found efficacious for meeting the difficulties that now threaten to obstruct the course of the cotton manufacture, and without interfering with, or creating difficulties, for the linen manufacture, by transferring, in part, the labour now bestowed upon one material to the conversion of the other. This could not be accomplished if the production of flax were, like that of cotton, in any great degree dependent upon the accidents of the seasons in one particular country, a disadvantage from which the cultivation of flax has always been free, while of late, the obstacle which, morally at least, stood in the way of its extensive production in the United Kingdom, has been made to disappear from our statute book. The adoption of flax as an auxiliary by our cotton manufacturers could not work any injury to the linen trade, since it would only make good the deficiency, if and as it should arise, in the production of cotton fabrics.

As a diversity of a literary character we next present a correct report of a Paper read in the Subsection of Ethnology, on the—

Primitive Races in Scotland,

by Mr. Daniel Wilson, Sec. F.S.A., Scot., and entitled an "Inquiry into the Evidence of the existence of primitive races in Scotland prior to the Celtæ."—He began by expressing his regret that the branch of physical archæology under consideration had heretofore been so little esteemed in this country in comparison to the contributions afforded by philological researches to Ethnology. Many important points still remain in doubt which it alone can answer, and while the philological evidence affords very valuable and precise information in regard to the diffusion of the Arian nations over Europe, it is a very important desideratum, even in this branch of the inquiry, to know whether the nomade Celtæ peopled for the first time the unoccupied wastes and forests of Europe, or superseded elder aboriginal races. Still greater is its value in relation to the other questions which demand a reply from the Ethnologist as to the origin of the human family from one or more stocks, and their migration from a common centre or cradle land—which, in so far as relates to the historic races, appears distinctly to coincide with the Mosaic history of the human race. Philological research has not as yet thrown light on the Allophylian nations of Europe, nor is there much probability that it can do so; and from the general misapprehension of men of science in England, of the value of archæological investigations, they have been rendered nearly valueless as a means for the ascertainment of truths relating to primitive ethnology. On the Continent it is otherwise; and especially in Sweden and Denmark, much has already been done in this department of inquiry, not without v luable results. Having briefly glanced at Professor Nillson's conclusions in regard to the primi-

tive inhabitants of Scandinavia, Mr. Wilson proceeded—With relation to the primitive inhabitants of Britain, we know that a Celtic people existed here at the earliest period in which we have any authentic historical information respecting them. At the period of the first Roman invasion, in the century before Christ, we obtain distinct evidence that the Celtic population of the southern parts of the British isles had already given way before later Teutonic migrations, excepting in the more isolated and peninsular portions of the south-west of England including the Cornish mineral districts. So far, therefore, as regards the intrusion both of the Celtic and Teutonic races into Britain, there is obviously no chronological parallel with the succession of races in Scandinavia, as assigned by Professor Nillson; nor have we any historical evidence as to the period when the Celtæ first crossed the British channel. It is not possible, within a reasonable compass, to point out all the arguments which prove the presence of a human population at a very remote period; but, added Mr. Wilson, in the museum of the University of Edinburgh there is preserved the remains of a fossil whale, dug up in the Blair-Drummond moss at a distance of seven miles above Stirling Bridge, and fully twenty miles from the nearest part of the river Forth, where by any possibility a whale could now be stranded; yet along with this was found the rude harpoon of deer's horn, which proved that this fossil whale pertains to the historic era, and points to a period more recent than that of the first colonisation of the British isles. In the same moss other fossil whales have been found—two of them accompanied with similar indications of the primitive arts of the aborigines. Many other relics, such as flint arrow-heads, stone hatchets, and bone implements, have been met with in the same moss, as well as in the carse of Stirling. And it is interesting to note, that we learn, not only from the historians of the fourteenth century, that the field of Bannockburn was surrounded with impassable mosses at that period, but still earlier remains prove that it was in the same state in the second century, when the Roman legions first crossed it on their road to Ardoch. Yet on clearing away this moss by the ingenious process which has given a peculiar interest to it in the eyes of our political economists, it was found to cover the indications of an ancient population, and even in some cases to surround their stone cists and cinerary urns. Similar evidence—which he stated his intention of producing hereafter in a more detailed form—justifies the conclusion that at a period nearly as remote as historic chronology will permit us to assume, there must have been a human population spread over the British Isles. Their rude canoes, formed for the most part out of an oaken trunk, have been found in various districts of the country, many feet below the accumulated alluvium, and accompanied in some cases with the rude tools of their builders, proving them to be the work of the aboriginal race, destitute of metallurgic arts, and supplying their simple wants with the imperfect implements of horn and silex. It is a question worthy of the consideration of ethnologists, Was this aboriginal race Allophylian? or was it only the first Celtic emigration which had lost, in the nomade state, the primitive metallurgic arts? Along with other methods of investigation, Mr. Wilson stated that he had adopted that which Nillson and Retzius have already employed, comparing and measuring the forms and dimensions of the crania. He then gave the result of a comparative examination of 39 skulls, and stated that three skulls on the table would afford a very satisfactory comparative estimate of the cranial capacity of the races of the Scottish tumuli. With these he compared certain skulls figured in Morton's Crania Americana. One is thus described by Dr. Morton:—"With a better forehead than usual, this skull presents all the prominent characters of the American race—the prominent face, elevated vertex, vertical occiput, and the great swell from the temporal bones upward." The second closely corresponds with the other type. These, therefore, afford a fair comparative criterion of the capacity of the tumuli builders of Britain for the practice of arts analogous to those in which the later American races so greatly excelled at the epoch of the Spanish conquest. It will be seen, he added, that the comparison is, upon the whole, in favour of the superior intelligence of the British race, in so far as this may be assumed to be indicated by the cerebral mass and frontal development. The skulls described (inclusive of others not enumerated in this abstract) may be received as offering some trustworthy examples of the cranial characteristics of the Scottish races. They have been selected from different localities, by various individuals, with no single purpose in view, and probably afford a fair average criterion of the primitive types of crania.

After referring to these, Mr. Wilson went on to say:—Dr. Pritchard remarks, in reply to the question—Was there anything peculiar in the conformation of the head in the British or Gaulish races? "There are probably in existence sufficient means for deciding this inquiry, in the skulls found in old British cairns or places of sepulture. I have seen about half a dozen skulls found in different parts of England, in situations which rendered it highly probable that they belonged to ancient Britons. All these partook of one striking characteristic, viz., a remarkable narrowness of the forehead, compared with the occiput, giving a very small space to the anterior lobes of the brain, and allowing room for a large development of the posterior lobes. There are some modern English and Welsh heads to be seen of a similar form, but they are not numerous." The skulls, Mr. Wilson observed, obtained from Scottish tumuli cannot with strict propriety be described as either remarkably narrow or very small in the forehead, when compared with the occiput. The first class might rather, he thought, be familiarly described as boat-shaped, the head being long and narrow, and tapering alike in the forehead and occiput. And to these appear to succeed a race closely corresponding in their cranial development to the first, or aboriginal Scandinavian race of Prof. Nillson. "Upon the whole," he added, "there is reason to conclude, from the imperfect and scanty evidence yet brought to bear on the subject, that the primitive race of the British tumuli, whether regarded as Allophylian or Celtic, was one abundantly capable of civilization, and with a cerebral development fully equal to that of races which have carried the practical and decorative arts far in advance of a mere Archaic period.

One characteristic feature in the skulls of various tumuli is the state of the teeth. It is rare to find among them any symptoms of irregularity or decay. In a tumular cemetery at North Berwick, however, the teeth of the skulls, though sound, were worn in most cases completely flat, like those of a ruminating animal. Dr. Thurnam remarks the same to have been the case with the teeth in those found in the Anglo-Saxon cemetery at Lamelhill; and it is also observable in an under jaw found along with other remains of a human skull, an iron hatchet, and several large boars' tusks, in a deep excavation on the south bank of the Castle Hill of Edinburgh. This peculiarity in the teeth of certain classes of ancient crania is of very general application. The inferences to be drawn from such a comparison are of considerable value, in the indications they afford of the domestic habits and social life of a race, the last survivor of which has mouldered underneath his green tumulus perchance for centuries before the era of our earliest authentic chronicles. As a means of comparison, this characteristic appearance of the teeth manifestly furnishes one means of discriminating between an early and a still earlier, if not primeval period; and though not in itself conclusive, it may be found of considerable value when taken in connexion with the other and still more obvious peculiarities of the crania of the earliest barrows. We perceive from it at least that a very decided change took place in the common food of the country, from the period when the native Briton of the primeval period pursued the chase with the flint lance and arrow, and the spear of deer's horn, to that comparatively recent period when the Saxon marauders began to effect settlements and build houses on the scenes where they had ravaged the villages of the older British natives. But the social state in the British isles was a progressive one. Whether by the gradual improvement of the aboriginal race, or by the incursion of foreign tribes, who were already familiar with the fruits of agricultural labour, the wild pastoral or hunter life of the first settlers was exchanged for one more suited to call forth the social virtues. The increase of the population, whether by the ingress of new tribes, or by the numerical progression of the first settlers, would of itself put an end to the possibility of finding subsistence by means of the chase. Thus, it might be from the inventive industry which privations force into activity that new wants were first discovered, and new tastes were created, and satisfied by the annual harvests of golden grain. The ploughshare and the pruning-hook dividedattention with the sword and the spear, which they could not supplant, and the ingenious agriculturist devised his oaken querne, his stone-rubbers, and at length his simple yet effective hand-mill, which resisted, during many centuries of change and progress, all attempts to supersede it by more complicated machinery. After some further observations, Mr. Wilson concluded as follows:—There is only one other point to which I would wish to advert, in reference to the archæological evidence which we possess in relation to the British Allophylian races, and to which, I venture to hope, ethnologists will be induced to devote more attention than they have hitherto done. The term Archaic has been very fitly applied to the period in relation to its arts. The ornamentation employed in the pottery is almost, without exception, only improvements on the accidents of manufacture. The same indefinite and archaic character prevails throughout the whole of our primitive ornamented relics, which are by no means rare. In the pottery, for example, the incised decorations are characterised by great variety, and an obvious progress is traceable; but in no single instance is any attempt made at the imitation of a leaf, or flower; of animals, or of any other of the most simple natural objects. The same is the case with the most beautiful gold and silver ornaments, and the decorated bronze weapons. It is curious and note-worthy to observe this entire absence of all imitation in the primitive British arts, because it is by no means a universal or even very general characteristic of the arts of Allophylian nations. The relics recovered from the sepulchral mounds of the great valley of the Mississippi, as well as in the regions of Mexico and Yucatan, display, along with the weapons and implements of stone, silex, and obsidian, numerous rude indications of imitative skill. The same is the case with the modern Polynesians. What I would specially note in connexion with this is, that both in the ancient and modern examples, the presence of the imitative arts accompany the existence of idols, and the abundant evidences of an idolatrous worship. So far as we yet know, the converse holds true in relation to the primitive British races; and as Dr. Pritchard has already attached so marked an importance to the contrasting creeds and modes of worship and polity of the Allophylian and Arian nations, I venture to throw out this suggestion as not unworthy of further consideration. Another peculiarity in which all the earlier races appear to differ from those of Teutonic origin is of a purely physical nature. In the tumuli we find the weapons and implements buried with the deceased, and wherever these have been obtained sufficiently perfect to admit of positive conclusions being drawn, they show that the hands of the earlier British races must have been extremely small, when compared with those of very moderate stature in our own day. It is curious that we possess the most indisputable evidence of the same

characteristic having pertained to the primitive temple builders of the new world. Mr. Stephens remarks, in describing the well-known symbol of the red hand, first seen by him at Uxmal:—"Over a cavity in the mortar were two conspicuous marks which afterwards stared us in the face in all the ruined buildings of the country. They were the prints of a red hand, with the thumb and fingers extended, not drawn or painted, but stamped by the living hand, the pressure of the palm upon the stone. There was one striking feature about those hands; they were exceedingly small. Either of our own spread over and completely hid them." This also I think is worthy of note, I have examined primitive British swords and daggers, the handles of which would be straitened for the grasp of many a delicate lady's hand.

An interesting discussion followed the reading of Mr. Wilson's paper, in which the value of his researches, as the first steps in an entirely new course of scientific investigation, were repeatedly commended. Mr. Robert Chambers also took occasion, from a reference to some geological theories advanced in his work entitled "Ancient Sea Margins," to state that, since the publication of that work, he had been led entirely to change his views on the subjects there treated of.

In the same room, on the following day, Friday, another literary production was brought forward.

On the Sicilian and Sardinian Languages, by Mr. John Hogg, M.A., F.R.S.

During travels in the Island of Sicily, the author of this paper said that he took down many words which are in common use with the peasantry, and these he subsequently compared with the true Italian. At that time, he conceived that the *Linguaggia Volgare* of that island must bear a great resemblance with the common language of Sardinia; but not being able to visit the latter island, he stated that he could not then obtain sufficient means for proving his supposition.

Mr. Hogg showed that the modern Sicilian dialect, which several authors have asserted as nearest to the Neapolitan idiom of the Italian, was in reality very distinct from it.

He arranged the chief dialects of Sicily under three periods; and the latter of which—modified after the expulsion of the Saracens, or Arabs—he more fully and critically noticed.

In this *Linguaggia Siciliana*, or as the author termed it, "modern Sicilian," he introduced some appropriate examples of words and phrases, comparing them with the Italian: and he then read several specimens of the broad but harmonous poetry of the later poets of Sicily, stating at the same time that prose compositions of any great value or importance were not to be found. Some stanzas from these examples of love songs and pastoral poetry, which he gave in the original tongue, and afterwards added literal English translations of them, were very entertaining. We cannot afford space in our *Gazette* for a review of the history of the different nations who successively became conquerors and rulers in that beautiful island, and which Mr. Hogg, in a brief but lucid manner, introduced as affecting material changes, from time to time, in the language of Sicily—each of these having left some remains fixed in the national tongue; and of these, perhaps, none left more traces than the ardent and southern Arab.

The author concluded the first part of his paper with two versions of the Lord's Prayer in two dialects of the Sicilian.

The second part, or that relating to the Sardinian tongue, he divided, according to Adelung, into the native and the foreign languages.

The former were distinguished into the northern and southern idioms, the differences between which the author pointed out; and some critical observations upon them were made, partly derived from Mr. Tyndale's recent and able work on "Sardinia."

The latter, or the foreign languages, were stated to be the dialect of Spanish called Catalonian, and a variety of the Tuscan; the first was originally introduced by Barcelonese immigrants, and the last by the Genoese.

Mr. Hogg observed that of modern languages Spanish had hitherto been considered nearest to the Latin, but it would appear that one of the dialects of the Sardinian was even more so. After adding many examples of Sardinian compared with Italian, and several sentences in Sardic, accompanied with English translations, he ended this second portion of his instructive essay with four copies of the Lord's Prayer in four different dialects of the Sardinian, in order that they might be compared with each other, and with the two versions of the same prayer in Sicilian, previously inserted.

After this paper was concluded, an interesting discussion took place on the languages of the neighbouring isles of Majorca, Minorca, and Malta; on the Provençal and Languedoc tongues; and on the Catalonian, as well as other dialects of the Spanish peninsula.

The remarks and queries of several travellers in the South of Europe created much attention in the sub-section of Ethnology.

The first paper contributed to Section B., that of Chemistry, was by Dr. George Wilson, and consisted of *Unpublished Particulars in the biography of the celebrated Scots Chemist, the late Dr. Joseph Black*, of whom Lord Brougham has been the historian. The interest attached to everything relating to so great a man will recommend this paper as one of the most popular in our list, especially as it enters into the characteristic traits which human curiosity is always desirous to gather respecting those who are famous in their age, and whose names are destined to descend with honour to the latest posterity.

Dr. Wilson observes that his remarks refer to Dr. Joseph Black less as a philosopher than as a man, and do not add much to the ample accounts we already possess concerning him; but they will be of interest to those who know the high place which is assigned to Black in the history of chemistry. And it may be well to remind the members, that he filled the chair of chemistry in this university between the years 1766 and 1799, and that very few now survive among even the latest of his pupils.

Two of these, Dr. Thomas Thomson, of Glasgow, and Lord Brougham, have comparatively recently recorded their reminiscences of some of the last public appearances of our celebrated professor. And one of our own vice-presidents, Dr. Traill, was present when Black introduced his successor, the late Dr. Hope, and has furnished me with valuable information for the present communication. The few particulars I have to mention refer almost entirely to Black's private life and personal character. My present purpose is to mention a few particulars concerning Dr. Black's habits and character; to show the section some interesting pieces of apparatus that belonged to him; and to correct two erroneous dates in his history.

In 1846, I unexpectedly learned from a lady in this town, that she had been acquainted for many years with an aged woman, who had been a servant in Dr. Black's household during the last five years of his life—viz., from the beginning of 1795 to the close of 1799.

She had often heard her refer in terms of praise to Dr. Black, and thought that I might find it worth my while to visit her informant, and learn what she had to tell concerning her old master. I was reluctant for a time to do this, as it was impossible that she could furnish any scientific information concerning the great chemist; and I could not reconcile myself to the unbecomingness of prying into the private history of one with whose affairs I had no right to meddle. As it appeared, however, that her references to Dr. Black were all of a kindly nature, and was certain that his history could afford no occasion for idle gossip or scandal, I thought myself at liberty to seek an interview with the old woman, who seemed likely to furnish additional proofs of the unfairness of the only charge brought against Dr. Black—viz., that he was avaricious, or penurious. I had a long interview, accordingly, with his former servant, in the spring of 1846, and the lady who introduced me to her also visited her at my request, and obtained answers to a list of written questions with which I furnished her. I had arranged to see her again in the autumn of 1847, but before this intention could be fulfilled, I learned that her mental powers had become rapidly impaired, and that no good could result from an interview. She died in 1848, about eighty years old.

Her maiden name was Elizabeth Hunter; she was married in Dr. Black's house, six weeks before his death, to a brother of the late Mr. Samuel Wordsworth, of Nottingham-place, Edinburgh.

Several of her connexions, resident in Edinburgh and the neighbourhood, still survive. She resided at Ballencrief, a small village near Aberlady, some seventeen miles from Edinburgh, now one of the stations of the North British Railway, but at the period when I visited her, a secluded solitary hamlet.

Although there was no room for doubting that Mrs. Wordsworth had been a servant of Dr. Black, I thought it desirable to obtain authentic evidence of the fact from herself. No special queries, however, were needed for the purpose. Her own questions addressed to me put the trustworthiness of her statements beyond doubt. In judging of their value it is to be noticed, that she had not resided in Edinburgh for some thirty years. The greater part of this period had been spent by her in solitary widowhood in the secluded country village already mentioned, where, declining the assistance which several friends would have given her, she earned a very scanty support by the sale of a few commodities.

Dr. Black, and the other distinguished men who resided in Edinburgh at the close of the last century, were the last topics of conversation, one should have thought of introducing, in Mrs. Wordsworth's humble cottage. As soon, however, as the first awkwardness of our meeting was over, and I had explained to her the object of my visit, she interrupted my questions, after our Scottish fashion, by questions of her own. One of the first was—"How is Mr. Hope? he was a fine lad, and a great favourite of Dr. Black." I need scarcely say that the party referred to was the late Professor Hope, who, at the period when the question was asked, was in his grave, after filling Black's chair for some fifty years.*

Another question was—"Did Dr. Ferguson," no doubt Dr. Adam Ferguson, Black's cousin, "still reside in Nicholson-street?" And a third query referred to "Geddes, the glass-blower, Leith," who is stated by Professor Robison to have lived on terms of "the most intimate and confidential friendship" with Black.† Geddes is still remembered by many. He was well known to all the Edinburgh experimentalists of the time, who had recourse to him for their glass apparatus.

Those references, and some others which I need not detail, gave me confidence in Mrs. Wordsworth's statements. She referred, however, to the parties named, as if quite forgetful that some fifty years had elapsed since she had known them; and Dr. Hope, to whom she made most frequent allusion, and always in terms of commendation, she appeared to think of as still in the vigour of youth. This was the only sign, if it can be considered one, which she displayed of failure in intellect. In other respects, her manner was prepossessing. She had much natural dignity in her bearing, and a grave, reserved, and taciturn air, suiting well with

* Dr. Hope acted as Black's assistant and substitute before he became his successor. He died in 1844.

† Preface to Black's Lectures, p. 71.

the deliberate precision of her answers. She had all her life, I was informed, been remarkable for her honesty and truthfulness.

I may add that she had nothing to gain by answering my questions; and that though very poor, she refused all remuneration for the trouble I had given her. She willingly, however, accepted an engraved portrait of her old master, which it is satisfactory to know, she pronounced to be an excellent likeness of what she termed his "simple face."

At first, with the characteristic caution of our Scottish people, when subjected to queries, the object of which they do not understand or appreciate, she answered warily; but as soon as she was satisfied that no sinister motive prompted my questions, she became more communicative, and in the end she seemed to take pleasure in recalling all that she could remember of her old master.

I had to let her tell her story in her own way, and omit many of the particulars concerning Black's personal habits with which she favoured me. There were three, however, which are amusingly characteristic, and these I shall mention.

His delicate state of health made him abstain almost entirely from animal food except in the form of milk, and even this he diluted with water. In connexion with this well-known practice of the great chemist, Mrs. Wordsworth furnished a particular singularly characteristic of his methodical habits. He did not dilute the milk he drank at random, but, as became so accurate a chemist, mingled it with water in a graduated drinking vessel, which his friend Mr. Geddes had made for him. Mrs. Wordsworth styled it "a marked glass, figured for the length of the milk and the length of the water."

There can be little doubt, as Dr. Gregory has suggested to me, that this was the vessel which Black died with in his hand, according to the striking description of his death given by Dr. Ferguson, which will be familiar to all acquainted with the biography of Black.

Another statement was equally illustrative of Black's methodical ways and not a little amusing.

"Mercury glasses," as my informant styled them, *i. e.* thermometers, were hung in all the rooms to determine their temperature, and the first thing that Dr. Black did on entering his sitting apartment, was to consult the thermometer. I could not learn distinctly whether or not the servants had been instructed in the use of those instruments, but at all events they had discovered that the "mercury glasses" told tales against them when they overheated the rooms or neglected the fires. They were in the habit, accordingly, when the thermometers stood too high, of holding them out at the window, and when they were too low, of placing them in front of the fire immediately before Dr. Black's entrance.

Mrs. Wordsworth mentioned the fact at first with a little reluctance, but when its recital was received with an involuntary smile, she exclaimed, as if proud of her own and her fellow-servants' cleverness in deceiving their master, "Deed did we;" and she added, that they were never "found out."

I mention but one other fact of this class. Summer and winter, Dr. Black wore three pairs of stockings; the innermost of lamb's-wool, the middle pair of grey worsted, and the outer pair of black silk. In addition to those coverings, he wore occasionally, when he went out of doors, a pair of "tin shoes," above his leather ones. I asked particularly about the metallic shoes. Mrs. Wordsworth stated in reply, that they were made of tinplate or white iron, and were unpainted. She knew them well, for they hung generally in the kitchen, and she characterised them as "unco boxes." Dr. Black did not wear them in the more public streets; but in summer when he latterly resided in a house on Bruntsfield Links, a little to the south of the middle walk of the meadows, he appeared with them in the avenues. The little boys were attracted by the tin shoes; and many a one, my informant added, looked at him as he walked feebly along, "with a stick in every hand."

Other particulars of a similar kind were mentioned to me by my informant, but I need not repeat them. It could not be expected that she should supply any information concerning her master's scientific researches; nor did I learn more on this point from her, than that there was a large garret containing crystal, and so full of "crooked things in glass, that you could not get your foot stirred for them." She was more competent to speak of his moral peculiarities.

The character which all Black's biographers have attributed to him of gentleness and amiability, Mrs. Wordsworth fully justified, both by direct statements and incidental allusions. He took great pleasure in watching the unconstrained movements of the lower animals, which is generally the sign of a genial and kindly nature. He was peculiarly fond of birds, and kept pet canaries, which were allowed a great deal of liberty; and his servants, also, had strict directions not to molest in any way the birds which frequented his garden. As might have been expected from so great a drinker of milk, a favourite cow came in for a share of his sympathies and good services.

Of his courtesy, his old servant spoke in the highest terms; and not merely in answer to questions on the subject, but spontaneously, and as if she loved to dwell upon the remembrance of it. She was so anxious, and so willing to illustrate this point in Black's character, that after the manner of those in her station, she reported, in a dramatic form, the substance of conversations which her master had held with her, when the absence of his old man-servant compelled him to ask some little service at the hands of the maids. The point of all these conversations was, that Dr. Black gave every one in his household as little trouble as possible; was polite in requesting the slightest service, and full of thanks when it was rendered.

There was but one matter on which I thought myself justified in putting a leading question to Mrs. Wordsworth. During Black's life, and afterwards, he was accused, if not of avarice, at least of unbecoming penuriousness. There does not appear to have been any better foundation for this charge than the fact that he left a considerable sum of money at his death. "It was impossible, however, that he could have done otherwise, after being so many years a very popular teacher, unless he had purposely thrown his gains away."

This charge has been revived by Lord Brougham, though not with a view to justify it, but only to account for it, in his recent biography of Black. "The ground of the charge," according to his lordship's belief, "was, that Black was said to have a scale by him when he received the fees of his students. I can answer," continues Lord Brougham, "for the truth of this statement, for I well remember the small brass instrument; but I also recollect that he said it became necessary from the quantity of light gold which he used at first to receive unsuspected, from one class particularly, of his pupils." —(Black's Life, p. 351.)

Professors Robison and Adam Ferguson have both vindicated Black from the charge of penuriousness. I thought it well, however, to hear Mrs. Wordsworth's opinion on the matter, as one on which she was both competent and certain to have come to a conclusion, and did not doubt it would prove such as to relieve her old master's character from an unfounded accusation. I asked her, accordingly, the direct question—was Dr. Black liberal in money matters? I got in return the amusing and, as I at first though, evasive answer, that "he was liberal to the clarionets;" in other words, to the street musicians, to whom he always gave silver, and who, in consequence, played twice a week before his door. On further inquiry, Mrs. Wordsworth, without giving any opinion of her own, mentioned what she seemed to think settled the question. Dr. Black's personal attendant, who had been twenty years his servant, became too infirm to assist his invalid master, and was dismissed with a pension of 10*l.* a year.

I attached more importance to some spontaneous statements of my informant. She dwelt strongly on the comforts of her situation in Dr. Black's household, and the contrast which existed between the very frugal diet he allowed himself, and the liberal one he granted to his servants.

The poor were not forgotten. When beggars came to the upper or main door, Dr. Black, in the words of my informant "served them himself," and the domestics were free to give what they liked to applicants at the lower door, and seldom allowed them to go away unassisted.

Another incidental statement struck me still more. Dr. Black wished his servants to attend, on Sunday, at the High Church, but did not insist on it. Some of them were dissenters, and went elsewhere, and he paid for their seats wherever they chose to go.

These are not the characteristics of a penurious or parsimonious man. It would have been altogether out of keeping with his precise, methodical habits in everything else, if Black had been found squandering his money in indiscriminate or romantic gifts; but the evidence of his servant appears not only to redeem him from the charge of being sordid or niggardly, but fully to entitle him to the character of having been liberal and generous in his dealings.

Such, sir, were the scanty particulars I learned from Mrs. Wordsworth, scarcely, I fear, worth your notice, or that of the section. They are not, however, I trust, without a certain slender value in assisting us in forming a conception of Black, as he was known to our immediate predecessors some fifty years ago. And although an air of triviality and mere gossip attaches to much that I have reported, it does not attach to all that I have brought before you. The impression made upon myself by Mrs. Wordsworth was a pleasing, but withal a sad one. It was touching to hear the aged woman, so soon about to be cut off from conscious connexion with the living, grow eloquent in the praise of her old master. She was plainly of a cold, hard, and unimpressible temperament. Her worldly affairs had not been prosperous, nor her married life very happy, and she had spent in poverty a long and solitary childless widowhood, away from everything which could remind her of Dr. Black. Perhaps she thought the more of him on that account. The years she spent in his service were not unlikely the happiest of her life, and contrasted in recollection with the darker season which soon followed her wedding under his roof. At all events, the memory of her master, as a gentle, generous, and benevolent person, had survived the oblivion of much that might have been supposed to have dwelt longer in her recollection; and when we consider that our defects in temper, discretion, or management inevitably involve our servants in discomforts which determine materially their judgment of our virtues, we cannot lightly estimate their impartial verdict upon us. Dr. Black appears to have compelled a decision in his favour, which no one who came in contact with him was disposed to question.

There are two dates connected with Black's career, which have been somewhat confounded; the one is that of his discovery of fixed air, the other that of his death. The earliest date generally assigned to the publication of his views on fixed air is 1755, whilst Black himself represents in his lectures, that the first account of his experiments was published in 1757.*

This last date is certainly a mistake, for which Robison, Black's editor, is responsible. In reality, there were three issues of Watt's celebrated essay on magnesia, one in Latin, and the other two in

* Black's Lectures, vol. ii. p. 57.

English. The Latin original was certainly published in 1754, as the printed copy in the library of this University shows. The treatise is styled *Dissertatio Medica Inauguralis, de humore acido, cibis orto, et Magnesia Alba.* The first part, treating of acidity of the stomach, was introduced to justify the presentation of the paper as a Dissertatio Medica. The second part contains the views of the author on fixed air. When the dissertation was published in English, the first section was omitted, and the second was entitled, "Experiments upon Magnesia Alba, quick-lime, and other alkaline substances," and appeared along with an "Essay on Evaporation," by Dr. Cullen. The copy from which I quote bears date 1782, (Thomson says 1796,) and is called the fourth edition, but it is a simple reprint of the earlier issues. Black's experiments were first printed in English in the second volume of "Essays and Observations, Physical and Literary, read before a Society in Edinburgh," p. 172. This volume appeared in 1770, (Thomson says 1755,) but Black's paper is dated June 5th, 1755, the period, probably, when it was read to the society.

I note these dates, because some discussion has recently occurred as to the exact period of Black's discovery. Robison's date of 1757 cannot be condered as authenticated by Black, as it was not published till after his death; 1755, on the other hand, was the date given during his lifetime, and is more trustworthy. To the world at large, Black's opinions were not fully known till they were printed in the Edinburgh Essays in 1770; but he had publicly announced them to the University of Edinburgh in 1754, and taught them from the chair of chemistry in the University of Glasgow, from 1756 downwards.*

In connexion with this, I show the section some pieces of apparatus which belonged to Dr. Black, and among others a pneumatic trough which he used when exhibiting the preparation of fixed air to his class. The following extract from the notes of his lectures† probably refers to this or to a similar piece of apparatus:—"Into a diluted acid, contained in a flask or phial, put a little alkaline salt, or chalk, or magnesia, and immediately stop the mouth with a cork, through which there passes a tube bent into a swan-neck. The other end of the tube is introduced (in Dr. Hales' manner) into an inverted glass jar filled with water, and standing in a tub of water. You will observe the effervescence, and the elastic bubbles rising copiously through the water to the top, where they collect, driving the water out of the jar.‡

This pneumatic trough, it will be observed, does not possess a shelf, and from its shallowness it must have been impossible to fill jars of any capacity in its cavity or well; and in truth it can only have been used for filling jars transferred to it full of water. It represents the second stage in the improvement of the pneumatic trough, after the system of suspending the jars by cords was abandoned, but before the shelf now in use was introduced.

It is curious, indeed, to notice how long it took before a piece of apparatus so simple as the pneumatic trough was brought to its present perfection.

It is now nearly two centuries since Boyle collected hydrogen and carbonic acid by the displacement of water. This was 1659; yet even in 1766, it had occurred to no one to make use of the simple device of supporting jars full of water intended to be filled with a gas upon a stool or shelf below the level of the water in the trough. So early, indeed, as 1765, Dr. Brownrigg placed a perforated board in his trough. His shelf, however, was above the level of the cistern or trough, on which it was fixed on a perforated lid or cover, and the jars were prevented by wedges from sinking too deeply through the holes in the board, which were wider than the jars. It was a *rack*, therefore, rather than a shelf, and less convenient than Hales' and Cavendish's method of suspension."* Mayow, Stephen Hales, and Cavendish hung their receivers by strings; and we must come down to the year 1775, before we find Dr. Priestley adding the shelf which served with him the purpose both of a shelf and a stool. In the quotation from his lectures just given, Black refers only to Hales, and as he began to lecture in 1766, the trough, or "tub," as he, like Cavendish, calls his apparatus, was probably destitute of a shelf.

Black, however, as we have seen, had improved on Hales' idea, and introduced a stool.

Whether this was borrowed from Priestley or not, I do not know, but so simple a device might readily occur to different observers. The word trough was first used by Priestley in consequence of his employing the troughs used in his day in Yorkshire for washing clothes, as a substitute for the tubs and barrels of his predecessors. From "Priestley's Autobiography," it appears that the celebrated surgeon of Leeds, Mr. Hay, requested and preserved Priestley's earliest pneumatic trough, which was a large washing vessel of earthenware.

The second date which demands correction is that of Dr. Black's death.

On the authority of Dr. Ferguson, adopted by Professor Robison, Black is said to have died "on the 26th November, 1799, in the seventy-first year of his age." Among the manuscripts, however, of James Watt, Mr. Muirhead found a letter indorsed Dr. Black's *last letter*, "which was written on the 2nd December, 1799, in which the writer mentions that he had been slightly unwell, but was then better; and in contradiction to his published statement, a letter is preserved from Professor Robison to Watt, in which he states that Black died on the 6th of December, 1799.

Mr. Muirhead has also shown that he died in his seventy-second, not as his biographers say, in his seventy-first year, for, in a letter to Mr. Watt, of 8th April, 1798, he writes "I have now finished my seventieth year."

We may note that this paper is of a kind rather uncommon to these philosophical transactions, and therefore we trust it will the better serve to entertain our readers by diversifying the selection we are making for their perusal. The particularity of the introduction relating to the old servant, the source of the intelligence, we may add, has amused us, as very Scottish in all its bearings.

The Rev. Dr. PAUL, of St. Cuthbert's, mentioned that there still survived a venerable lady, who, he believed, was able to communicate much interesting information regarding the illustrious chemist. Dr. Paul was understood to refer to the widow of Professor Robison, and the mother of Sir John Robison.

On the Language and Mode of Writing of the Ancient Assyrians, by Doctor Hincks.

The author began by observing that, while the most valuable ethnological information might be expected to be contained in the various Assyrian records which have been discovered, the number of which is daily increasing; and while it is of the highest importance to study the language and mode of writing of this people, with a view to obtain this information; their language and their mode of writing are themselves two important ethnological facts. The language of the Assyrio-Babylonian inscriptions is generally admitted to be of the family called Semitic. It is in many respects strikingly like the Hebrew; but has some peculiarities in common with the Egyptian, the relationship of which to the Semitic languages has been already recognised. The most remarkable of these peculiarities is that the Assyrian and Egyptian have a sibilant in many cases when the Hebrew, Arabic, and others have a single aspirate. This was shown to be the case in the causative conjugation of the verb and in the pronouns of the third person. The mode of writing of the Assyrians differed from that of the Hebrew and other Semitic languages, and agreed with the Egyptian in that it was partly ideographic. Some words consisted entirely of ideographs; others were written in part phonetically, but had ideographs united with the phonetic part. As to the parts of the writing which consisted of phonographs, Dr. Hincks maintained, in opposition to all other writers, that the characters had all definite syllabic values: there being no consonants, and consequently no necessity or liberty of supplying vowels. The uncertainty as to the mode of reading proper names, which was admitted to exist, did not arise from the omission of vowels, but from the small number of consonants that were distinguished from one another, and the consequent ambiguity of many syllabic characters. In proof that the characters had definite syllabic values, he handed about copies of a lithographed plate, in which examples of various forms of words analogous to those existing in Hebrew were collected together. These he considered to be much safer guides to the true reading of the language than proper names; the corresponding forms of which, in Assyrian and other languages, might be very different. This use of characters representing syllables, he considered to be an indication that, though the language of the Assyrians was Semitic, their mode of writing was not so. Characters which represent syllables are quite contrary to the genius of the Semitic nations, which marked the consonants, and in general the consonants only. A second proof that the mode of writing was not Semitic he derived from the absence of distinct syllables to represent combinations of the peculiar Semitic consonants, Koph and Ain. The former was sometimes expressed by *c*, sometimes by *g*, and sometimes by *w* or *wh*, which is also used to represent *m*. The Ain was sometimes altogether omitted, and sometimes expressed by *w* or *wh*, in the same manner as the Koph. From these facts he inferred that the Assyrio-Babylonian mode of writing was adopted from some Indo-European nation which had probably conquered Assyria; and he thought it likely that this nation had intercourse with the Egyptians, and had, in part at least, derived their mode of writing from that most ancient people.

Major RAWLINSON observed that a discussion on the cuniatic character hardly came within the scope of ethnological research; but that the accounts of the cuniatic inscriptions were undoubtedly of great importance to this department of science. He intended, accordingly, to make a few observations on the three systems of cuniatic writing. The first, or the Persian, was of the Arian family, closely allied to the Sanscrit. The Persians, who spoke this language, came apparently from the Oxys, about fifteen centuries before the Christian era. These Persians were met with by the Assyrians about the Caspian Gates, at the earliest period of their recorded history; and all the antique traditions of the race are connected with this particular tract of country. At a subsequent period they must have moved to the south. The opening chapters of the Vendidad confirmed this tract, as they described the Persians moving from east to west. He considered that the present language of Persia was a direct derivation from the old language of the inscriptions; and he mentioned many circumstances confirmatory of that view. He then proceeded to consider the second branch of cuniatic writing, which he denominated Scythic, observing that it was, in all probability, the aboriginal language of Persia previous to the emigration of the Arian race. The grammatical forms and postpositions, &c., evidently connected the language with that of High Asia; and there were other points of evidence, deducible from the language itself, tending to the same conclusion. One of these examples was the name of "Parthamaspati," which was given by the Greeks to the Parthian kings, and which was found in exact accordance with the orthographic rules of the language—Parthia being often called Parthamas,

* Experiments upon Magnesia, &c., p. 72.
† MS. Lectures.
‡ Black's Lectures, vol. ii. p. 66.

* Phil. Trans. 1765, p. 235.

The people who used this language, brought themselves to consider an ethnological distinction, inasmuch as after the name of Oromasdis they interpolated the epithet "God of the Arians," thereby indicating a distinction of religion appertaining to a distinction of race. In the same way, Darius Hystaspes, in the inscription on his tomb, names himself an Arian, and of Arian descent. The same distinction was marked by the Greeks at the time of Alexander, who first noticed the Dualistic doctrines of Persia, observing that the Arian race acknowledged the two distinct principles of good and evil. Major Rawlinson added that the language of these Scythian inscriptions appeared to be now altogether lost. He had been unable to trace any remains of it in any of the spoken dialects of Persia. He then went on to consider the third class of writing, which he denominated Assyrian and Babylonian. This he stated was of the Semitic character, being closely allied to the Hebrew and Chaldaic. The language in question had recently acquired great general interest from the discovery of the numerous inscriptions recently disinterred in Assyria and Babylonia by Mr. Layard and others. There was a difference of opinion as to the antiquity of the earliest of the inscriptions. Mr. Layard had himself conjectured that they ascended to the enormous antiquity of 2500 years before Christ. Others had reduced them so low as 700 or 800, the era of Shalmanezar and Sennacherib, the Assyrian kings mentioned in Scripture. Major Rawlinson said he followed neither the one nor the other, but adopted a mean between the two—fixing the date of the earliest inscription at about 1300. His reasons for fixing this date was, that the cities of Phœnicia (Tyre, Sidon, Byblus, Aradus, &c.) were mentioned in the earliest inscriptions—thus showing that the date of these inscriptions must be posterior to the foundation of the cities in question. He further mentioned that all the geographical indications tended to show that the earliest Assyrian inscriptions were about synchronous with the earliest inscriptions of the 19th and 20th dynasties of Egypt. Another proof of the antiquity of the inscriptions was, that several Chaldean ones were noticed at Nimrod and Khorsabad, which appeared to be of great importance; whilst at the sites of those cities which had lately been visited by Mr. Loftus, the inscriptions on the slabs and bricks make use of entirely different geographical names—the conclusion being that a very considerable interval of time must have elapsed between the one period and the other, during which these geographical names had been altered. Another argument tending to show the proximate date of the inscriptions was, that Herodotus specially assigned to the Assyrian empire a duration of 520 years anterior to the defection of the Medes—an event which was known to have taken place in the eighth century before Christ. Dr. Hincks had suggested that the Assyrians were of Indo-European origin, but Major Rawlinson did not agree with him in this. He thought that, physiologically as well as ethnologically, they must be assigned to a Semitic source. He doubted indeed, whether they had ever come in contact with Indo-European tribes, except at solitary points. The Assyrian arms had certainly never penetrated to India. There was no notice of that country in any of the inscriptions. The Assyrian kings warred in Egypt, Syria, Asia-Minor, Armenia, Mesopotamia, Chaldea, Babylonia, and Medea, but they never had pushed their arms farther to the east than about the Caspian Gates. The Sacæ or Cymri, who were frequently on the inscriptions at Khorsabad, and who appeared to have been generally introduced into the Assyrian empire about the thirteenth century before Christ, were probably of Scythian origin. He thought it impossible to identify this tribe immediately with the Gaelic Cymri. It appeared more probable that, under the name of Cymri, the Assyrians included all the Nomade tribes with whom they were acquainted without respect to ethnological family. He suggested that the Celts had subsequently applied this generic name specifically to themselves, as among the Moguls of the present day a particular tribe had taken the name of "Eluth," or "Ilyat," which properly denoted a mere Nomadic population. The other tribes with which the Assyrians were chiefly brought in contact were the Shetta or Khyta in Syria, and the Ludi in Lower Babylonia. The former tribe were well known from the inscriptions of Egypt, and the latter were probably the same people who were mentioned in Ezekiel under the name of "Lud" in connexion with "Phut" and "Elam." These tribes of Khita and Luda were both undoubtedly of Semitic origin,—the names of the kings who ruled over them being very similar to the names of the Assyrian monarchs. Major Rawlinson farther observed that with every fresh material that was collected, the more important would be the ethnological results that would follow. Every succeeding month fresh discoveries were noticed. In Lower Chaldea many interesting sites had lately been visited and examined. At Senkera a pavement of bricks had been laid bare entirely covered with writing. In the same place a brick had been found commemorating the son of Cambyses, who was previously altogether unknown in history. The bricks and clay tables found at Niffer, at Werka, and at Umghir, preserved the names of many kings who had previously been unknown. They were apparently of the family of Nabonaser, and preceded Nebuchadnezzar by several generations. Werka was one of the most interesting places in the land. It appeared to be a holy city of Assyria, forming, in fact, one great necropolis, to which the ancient people of these countries were in the habit of conveying their dead from all quarters. The place was traditionally the Urr of the Chaldees, or that city from which Abraham came out. This fact was mentioned by the earliest Arab authors, and was derived from Jewish tradition. Such had been the discoveries in Lower Chaldea. Those in Assyria had been of even greater interest. In excavating underneath the great pyramid of Nimrod, the tomb of Sardanapalus, the founder of the city, and a statue of the king, were found in a vaulted chamber, which vaulted chamber was entirely covered with inscriptions containing the records of the monarch's reign. Many other tables and cylinders had been found covered with historical writings; but the most important of all was "the house of records." Mr. Layard, at Koyunjik, had penetrated into a chamber which appeared to be of the same class as the house of records noticed by Ezra, where was found the copy of the decree of Cyrus permitting the Jews to return from captivity. In this chamber Mr. Layard found an enormous number of *terra cotta* tables piled up from the floor to the ceiling, and representing apparently the archives of the empire during a long historical succession. Mr. Layard had packed, by the last accounts, five cases for transport to England, but he had only exhausted one small chamber of the apartment. When the whole collection had been disinterred and examined, it was probable that we should have a better account of the history, religion, jurisprudence, and philosophy of the Assyrians, thirteen centuries before the Christian era, than we had of either Greece and Rome during any part of their history.

On the Succession of Strata and Distribution of Organic Remains in the Dorsetshire Purbecks. By Professor Edward Forbes.

During the autumn of 1849, Professor E. Forbes was deputed by the Director-General of the Geological survey, Sir Henry De la Beche, to examine the organic remains of the Purbeck strata in Dorsetshire, and to investigate their distribution *in situ*, acting in co-operation with Mr. Bristowe, the officer engaged in constructing the geological map of the district. The results of this inquiry were so novel and curious, that it was thought by the Director-General desirable, before publication in an extended form, to lay them before the British Association, in the hopes that by such a course attention may be directed to similar phenomena in fresh-water formations in other districts. Our knowledge of the Dorsetshire purbecks has been derived chiefly from the memoirs by Professor Webster, Dr. Fitton, Sir H. De la Beche, Dr. Buckland, and Dr. Mantell. With the exception of certain vertebrata (reptiles and fishes), we owe to Dr. Fitton our information respecting the fauna. No minute investigation of the strata, in connexion with their organic contents, had, however, been undertaken, nor had the latter been collected to any extent, as may be seen when the published lists, including about twelve species of Mollusca and Crustacea from these beds, are compared with those now submitted to the section, in which more than seventy members of those classes are enumerated. This increased catalogue is not merely of value on account of the great numbers of species; it is remarkable on account of the new and interesting light it throws on the distribution of fresh-water creatures during the oolitic period.

The points at which these observations were made were Lulworth Cove and the neighbouring bays, Warbarrow Bay, (on one side of which, at Meup's Bay, is the clearest and most complete of all the Purbeck sections,) Osmington, Upway, and Ridgeway, between Weymouth and Dorchester, and Durlestone Bay, near Swanage. Subsequently the base of the Purbecks was exposed in the great Portland quarries at Swindon; a section which had previously been examined and accurately described by the Rev. J. Brodie, was visited, and found to correspond exactly in mineral characters and organic contents with the beds at the base of the Purbecks in Dorsetshire. From all these localities ample collections were made, in which the author had the assistance, for several months, of Mr. J. Gapper, of the Geological Survey. The results of these researches, whether new or confirmatory of older observations, may be stated briefly as follows:—

1st. There is no passage from the Portlands into the Purbecks. The top beds of the Portland stone are purely marine: the lowermost beds of the Purbeck are purely fresh-water, containing *Cyprides, Valvata*, and *Limneus*. At Meup's Bay, these lowest fresh-water beds, forming the "cap," occupy a thickness of a little more than eight feet, and are surmounted by the great dirt-bed, containing the stools of *Cycadaceæ*. A little above this dirt-bed is a second, less developed, and a similar one occurs in many places below it.

Above the highest dirt-bed, the Cypridiferous shales which follow are strangely contorted and broken up in all the sections at the west end of the Isle of Purbeck. These are capped by undisturbed beds full of Cyprides, succeeded by twenty feet or more of shales, calcareous slates, marls, and limestones, with occasionally siliceous bands, all, for the most part, deposited in brackish water, and filled, in many places, with *Rissoæ* of the subgenus *Hydrobia*, and a little *Cardium* of the subgenus *Protocardium*.

Many of these beds abound in a species of *Serpula*, closely allied to, if not identical with, *Serpula coacervites* of the German Purbecks. There are above thirty feet of these brackish water-beds at Meup's Bay. They are capped by purely fresh-water marls, containing the same species of *Cypris, Valvata*, and *Lymneæ*, as occur in the lowest beds of the Purbecks.

Suddenly, without any disturbance, a change takes place. A very thin band of greenish shales, full of impressions of leaves like those of a large *Zostera*, and with traces of marine shells, cuts off the fresh-water strata. Immediately, however, new fresh-water beds succeed, filled in many places with fossils, species of *Cypris, Valvata, Paludina, Planorbis, Lymneus, Physa*, and *Cyclas*, all different from any we had previously seen in the lower beds. Thick bands of chertz stone, filled with these fossils in a beautiful state of preservation, occur, and among them are for the first time in the oolitic series, *Cyrogonites*, the spore vesicles of *Chara*.

Immediately above these interesting bands (in which many remains of fish were also found) is the great and conspicuous stratum long familiar to geologists under the local name of "Cinder-bed," formed of a vast accumulation of *Ostrea distorta* shells. On the summit of this bed, the author discovered the first Echinoderm ever seen in the Purbecks. It proved to be a species of *Hemicidaris*, a genus characteristic of the oolitic period; it was accompanied by a species of *Perna*. The cinder-bed is succeeded by limestones and shales, partly of fresh water, and partly of brackish origin. In these the same species of *Cypris* occur, which mark the shaly bands near the chert below the cinder. Many fish, especially species of *Lepidotus* and *Microdon radiatus*, are found in these bands; and in the fine collection of Mr. Wilcox, of Swanage, are the heads of two magnificent species of the reptile *Macrorynchus*, from this horizon in the Purbecks. Among the mollusks a remarkable ribbed *Melania*, of the section *Chilira*, is found here. After the deposition of these strata, there came another powerful influx of the sea, introducing marine species—*Pectens*, *Modiola*, *Avicula*, and *Thraciæ*—all undescribed forms. Brackish-water strata full of *Cyrena*, and traversed by bands abounding in *Corbulæ* and *Metaniæ*, are next in order; in them is a *Protocardia*, but quite distinct from its representative species in the lower portion of the Purbecks; limestones, with cyprides, turtles, and fish, crown these brackish-water bands, and are specifically connected with the beds of the middle Purbecks below them.

Lastly, a third series of fresh-water strata commence with a new series of fossils—*Cyprides*, *Paludinæ*, *Physa*, *Limneus*, *Planorbis*, *Valvata*, *Cyclades*, and *Unio*, and fresh forms of fish. These continue until they merge into the base of the Hastings sands, and the Purbeck series is completed. The total thickness of all the Purbecks at Meup's bay is about 155 feet. Of this one half is occupied by the lower portion of the series, and the remainder is divided between the middle and upper portions, the former being rather the more extensive.

It is very remarkable, that whilst we can strictly divide the Purbecks into upper, middle, and lower, each marked by a peculiar assemblage of organic remains, the lines of demarcation between these sections are not lines of disturbance, nor indicated by striking physical characters or mineral changes. The features which attract the eye in the Purbecks, such as the dirt-beds, the dislocated strata at Lulworth, and the cinder-bed, do not indicate any breaks in the distribution of organized beings. The causes which led to a complete change of life three times during the deposition of the fresh-water and brackish strata of the Purbeck series, must be sought for, not simply in either a rapid or a sudden change of their area into land or sea, but in the great lapse of time which intervened between the epochs of deposition at certain periods during their formation. A most striking feature of the molluscan fauna of the Purbecks is this—so similar are the generic types of these mollusca to those of tertiary fresh-water strata and those now existing, that, had we only such fossils before us, and no evidence of the infra-position of the rocks in which they are found, we should be wholly unable to assign them a definite geological epoch. An examination and comparison of these Purbeck fossils with the collections from the Hastings sands and Wealden in the Museum of the Geological Society (to which they were chiefly presented by Dr. Fitton), and in the cabinet of Dr. Mantell, leads the author to believe that the fauna of the middle and upper divisions of the Wealden series is, so far as species are concerned, almost entirely distinct from that of the lower or Purbeck division. Many of the species reputed to be common to the whole series, are found on inquiry to include more species than one under one name; whilst some other forms recorded as Wealden, but so far as the author has observed, peculiar to the upper Purbecks, and occupying only a limited horizon in that part of the series, are derived from certain anomalous strata near Tunbridge Wells, which the author believes will prove, on closer examination and accurate survey, to be Purbeck strata, brought up among the Wealden clays by faults. The excellent monograph on the Wealdens of North Germany, by Dunker and Von Mayer, in which a vast number of species of animals and plants are described, and accurately figured, affords the strongest confirmation of this view; and shows that while the faunas of the German Weald clays and Hastings sands correspond in essentials with that of the same formations in Britain, the Purbecks of the continent, just as here, differ from the superior beds almost entirely in their organic contents, and correspond with similar beds in our own series.

On the European Species of Echinus, and the peculiarities of their distribution. By Professor Edward Forbes.

When the author published his account of the British Echinodermata, he laid great stress on the distinctive characters furnished by the sculpture of the spines in each species. In this communication he endeavoured to show that these characters are of the most certain kind, that they bear definitive relations to the more important features of the organization of the test, and that through them we are enabled easily to recognise even the most aberrant varieties of each species.

In the work alluded to, five species of *Echinus* were enumerated as British: viz. *E. Sphæra*, *E. Flemingii*, *E. Miliaris*, *E. Neglectus*, and *E. Lividus*. Although during the ten years which have passed since the publication of this list, the most active exploring researches have been carried on in our seas, only two additional forms have been brought to light.

One of these is the *Echinus Norvegiens* of Duben and Koren, a pretty species of small size, first observed on the Norwegian coasts, and since dredged by Mr. McAndrew off the shores of Zetland. The other appears to be identical with the *Echinus Melo* of the Mediterranean. It was discovered on the coast of Cornwall, by Mr. Peach. It exceeds all our other British species in size, and is nearly allied to *E. Sphæra*.

The researches of Duben and Koren on the shores of Norway, have now made us fully acquainted with the distribution of Echinoderms to the north of Britain. The works of Mediterranean naturalists, and the author's own researches, have afforded ample information respecting the southernmost European species. There remained to connect the Mediterranean and Celtic provinces, by an examination of the Lusitanian coast. Valuable materials towards filling up the gap have been procured by Mr. McAndrew, during his recent cruize on the Spanish and Portuguese shores, and submitted to the author for examination.

On comparison of all the materials thus brought together, it would appear that the species of the genus *Echinus*, inhabiting the European Seas, indicate four principal types of distribution; 1st. An Arctic, to which *Echinus Elegans* appears to belong; 2nd. A boreal, of which *Echinus Norvegiens* and *Neglectus* are members; 3rd. A Celtic, of which *Echinus Sphæra* and *Muliaris* are the characteristic forms; 4th. A Lusitanian, of which *Echinus Excellentus*, *Lividus* and *Melo* are members, and to which also the little Mediterranean *Echinus Monitus* belongs. *Echinus Flemingii* is probably also a member of this southern type.

On the Infra-littoral distribution of Marine Animals on the Southern, Northern, and Western Shores of England and Scotland. By Professor Edward Forbes.

In the year 1839 a Committee of the British Association was formed for the purpose of investigating the natural history of the British seas by means of the dredge. A chief object of the research proposed was the ascertaining the exact relation of the fauna of the British seas at the present epoch to that of the same area during the epoch of the so-called northern drift. Such of the members of the committee as have engaged practically in the pursuit of the desired researches have obtained a vast body of accurate observations and carefully stated facts. These have been registered at the time of observation in printed formulæ, and a large number of these papers—"Dredging papers," as they are called—have, during the years of the existence of the committee, been collected together.

The report now laid before the meeting embodies the results of these inquiries, so far as they relate to the southern, western, and northern coasts of Great Britain. The tabulated forms relating to these regions have been filled up and the observations conducted chiefly by the reporter and Mr. McAndrew, who either singly or in co-operation, have investigated the marine zoology of the coasts in question in numerous localities from the shores of Hampshire westward and northward to the Zetland Isles. Very full notes respecting localities and depths of species, taken separately, of these districts have been contributed by Mr. J. Gwyn Jeffreys and Mr. George Barlee, who have indefatigably collected the testaceous mollusks of the British seas. In the Clyde province, accurate and extensive observations on the depth and range of the marine animals have been made by Mr. Smith of Jordan-hill, the first geologist who sought for new information in his science through the aid of the dredge, Mr. Hyndman, Mr. Alder, and the Rev. D. Landsborough. In the south of England the depths of not a few rare species have been noted by Mr. Clark, of Bath. A most careful and completed list of the mollusca dredged, their range and ground carefully noted, has been drawn up in the Orkney Islands by Lieutenant Thomas, R.N., who has, moreover, noted the depths of the mollusca from the Thames to the Orkneys. From all these materials the report now presented is constructed.

Much, but not as yet nearly sufficient data of the same kind have been obtained from the eastern coasts of Great Britain, and from around the shores of Ireland. It is to be hoped that the activity of sea-going naturalists will complete the required series of observations from these districts, and enable full tables to be presented at future meetings of the Association.

This report consists chiefly of tables of two kinds:—

1st. Tables, systematically arranged, of the species of animals dredged, all the depths at which they were taken during the inquiries, and the mineral character of the sea-beds on which they were found, being stated for each species. These tables are extremely full, so far as mollusca and echinodermata are concerned, less so respecting other tribes of animals, but nevertheless, more extensive than any yet made known.

2nd. Tabulated abstracts of the dredging papers, each separately abstracted; the year and place of observation, the distance from shore, the depth, the ground, the number of species of univalve testacea taken alive, and of those taken only dead; the same as regards bivalves; the number of species of echinodermata, and remarks under which the creatures taken most abundantly in each instance are recorded. More than a hundred papers, all relating to the district under report, are so abstracted.

In these tables, the region explored is divided into ten provinces—five upon the English coasts, and five on those of Scotland. These provinces are not arbitrary sections, but represent areas, each presenting peculiar zoological features. The five English provinces are—1st. The coasts of Dorset and Hants, a region peopled from the general fauna of the English Channel, but deficient in many of the species which give a character to the 2nd province, the coasts of Devon and Cornwall, where we have the most southern type of the fauna of Great Britain, and the greatest number of Lusitanian forms appearing. 3rd. The Bristol

Channel and southern shores of Wales, where we have a southern character still presented by the fauna, but less intense. 4th. The coasts of North Wales, where we have the characteristic fauna of the Irish Sea, marked more by deficiencies than by many peculiar species. 5th. The seas around the Isle of Man, where the northern and southern types of the British marine fauna, each faintly indicated, meet, as it were, in the middle of a region markedly of the British or Celtic type. 6th. The region of the Clyde, and the lochs which branch from it, an area of great interest, for in these great sea-lakes we find imprisoned, as it were, assemblages of marine creatures which remind us of the inhabitants of the Arctic seas, and strikingly of the population of the British seas during the glacial epoch. 7th. The seas of the Inner Hebrides, presenting similar phenomena, but influenced by the currents of the great Atlantic. 8th. The seas of the Outer Hebrides, and the district around Cape Wrath. 9th. The Orkneys, where the peculiarities of the northern part of the German Ocean come in contact with those of the Atlantic regions; and 10th. The Zetland isles, where we find the marine races of Britain mingled abundantly with creatures of unquestionably Scandinavian and Arctic parentage, not isolated or straggling, as those of similar character in the western provinces are, but seated at the true bounds of the great boreal province which here intersects the British seas.

The dredge has been used within the area reported on in all depths between four and 100 fathoms. Everywhere do we find the distinction of littoral, laminarian, and coralline zones maintained; and in the Scottish provinces, that deeper region, to which Professor Forbes had previously given the name of "deep sea coral," on account of the number and abundance of calcareous zoophytic and bryozoic polypedoms procured from the greater depths. Between the coasts of Cornwall and Ireland, Mr. McAndrew has dredged, and carefully noted the mollusca inhabiting the region of fifty fathoms; and it is very curious and interesting to observe, that only at such depths, and in peculiar localities in the southern part of the British seas, do we find those species of Scandinavian origin, which give a feature to even the shallower zones in the sea beds of North Britain.

The tables now presented show, that whilst certain species of marine creatures are absolutely restricted to defined provinces of depths, those of the littoral and laminarian zones being especially limited in range, others, and not a few, have a power of enduring all the various conditions between the coastline and 100 fathoms; but in every case of wide range, there is some portion of it in each region where the individuals of the species attain a maximum in number; in the higher zones of our sea, by the presence of peculiar genera as well as species; but in the lower zones, the peculiarity is maintained almost entirely by peculiar species of genera, which have a wide bathymetrical range.

According to the nature of the sea-bottom, the proportion of species and of individuals of particular tribes of mollusca and radiata is determined. Among the former, the acephalous species prevail over the para-cephalous, in proportion to the more sandy or muddy character of the soundings; whilst the latter equal or exceed the former when the bottom is of nullipore, or hard, or abounding in stones of size.

A comparison of the species of mollusca and radiata in the several provinces before enumerated shows beyond question that there is a distinct distribution of them horizontally, and that the elements of our marine fauna are derived from opposite directions, mingled, however, with a general assemblage, of which the British seas may be regarded as the centre. Of the infra-littoral species of mollusks (to which portion of that class these tables more especially relate), between twenty and thirty kinds increase in abundance of individuals and localities as we proceed from south to north; whilst between twelve and twenty become strikingly more prolific as we proceed from north to south. Nearly twenty species are characteristically southern, and about half that number strictly confined to the extreme south; more than 40 species are characteristically northern, and about 12 are confined to the extreme north. Between 30 and 40 species are universally and equally abundant throughout our seas. About 20 species are frequent at both extremities of Great Britain, rare or absent along its western central shores; such are mainly of southern origin, and their course northwards is to be traced not along the western coasts of England, but along the western side of Ireland, where they are diffused to the north by favouring currents. To the influence of Rennell's current we may attribute much of the southern element in our marine fauna; to that of currents setting in from the north, the Scandinavian and Arctic elements. But when all the cases of distribution clearly to be attributed to such influences are enumerated, there remains a residue which we can only explain by going back to epochs anterior to our own, and to a different conformation of the coasts of Europe, and a different set of currents from those which now prevail.

The details of this report will be published in the Transactions of the Association.

In the section of Geology we have been much pleased with an improved tone in the discussions; which have been, during the whole meeting, much more sober and less complimentary than on preceding occasions. Four papers were read on the first day, to which we shall do justice hereafter.

Having disposed of this mass of matter, reserving still some other important communications, to afford their full value to the routine, we now take up some of the Sectional business on the first day, noticing the subjects as they deserve, for their novelty or originality, more or less at length in our resumé.

THURSDAY.

Section A.—Mathematical and Physical Science.

1. Mr. F. Ronalds' report on the observations and experiments at the Kew observatory.
2. Rev. Baden Powell.—Report on luminous meteors.
3. W. J. M. Rankine, Esq., on the laws of the elasticity of solids.
4. Rev. Dr. Scoresby, on Atlantic waves; their magnitude, velocity, and phenomena.
5. Professor G. G. Stokes, on metallic reflexions.
6. Professor G. G. Stokes, on a fictitious displacement of fringes of interference.
7. Rev. B. Powell, on the refractive indices of several substances.

1. Mr. Ronalds' report was necessarily little more than an enumeration of the subjects contained in his seventh annual volume. He stated that the Birmingham grant of 250*l.* had not only been applied towards the fitting up of a mechanical laboratory, and other incidental expenses at Kew, but also towards the establishment, according to the views of Her Majesty's Government, of an exact system of registering the variations of magnetical instruments in colonies. A vertical-force magnetograph had arrived at the Observatory at Toronto, which experiments made at Kew had enabled Mr. Ronalds to construct (for the first time) in an approved manner, and which he trusted would be found, by the able director of that observatory, an *exact* instrument. He said that another vertical-force magnetograph is in course of construction for the Kew Observatory, with further improvements; that the horizontal-force magnetograph, sent out last year from Kew, had also arrived at Toronto, and that the actual cost of constructing both instruments had been refunded by Her Majesty's Government. That a system of copying all photographic delineations, which might be produced from *any* photographed (or other) self-registering instruments, had been adopted, whereby printed engravings may be produced in any *required* quantities for distribution, &c., with great facility and despatch, and little cost; that the photo-barometrograph, described in a former report, had been improved, and rendered (like the magnetographs) applicable to either the Daguerreotype or Talbotype process; that he had been engaged also upon an improvement on the method of dividing the *time scale* of his ordinate board (for measuring the values of magnetic or other curves), by a modification of the "lazy lack," and a new pair of *parallel* dividers, useful to draughtsmen and *engravers* generally, as well as for this purpose; and, finally, that something had been attempted towards the prosecution of a preparatory series of observations on the *frequency* of atmospheric electricity, a subject of inquiry which formed a principal feature in the list of proposals for new experiments, or the continuance of old ones, appended to his last report. This *preparatory* course had, he said, been interrupted by untoward events, which he had not been able to control. He then slightly alluded to the usual matter relative to the state of the building and instruments, and to the introductory matter of the very short journal of Observations, containing his instructions for the preparatory course of frequency observations and of the manner of making them, in which a time-piece (formally described) was advantageously employed to give geometric values of the times required for the principal conductor to acquire a maximum charge of electricity, after it had been suddenly and artificially discharged.

Having made this short statement, Mr. Ronalds exhibited first Daguerreotype plates, which had received photographic delineations of curves produced in the declinated magnetograph, the horizontal-force magnetograph, and the barometrograph, by the action of light; secondly, tracings on gelatine paper, which had been obtained from the abovementioned curves, by means of an etching point; and thirdly, the printed impressions of those tracings obtained by means of the usual copperplate printing press and common printer's ink, the sheet of gelatine paper having been (in short) used exactly as if it were an engraved sheet of copper, excepting that a *rather* tighter "pinch" was employed.

Prof. Phillips bore testimony to the ingenuity and zeal of Mr. Ronalds, and gave a brief history of the Observatory at Kew, and the proceedings thereof. He characterized it most truly as an experimental observatory for opening out new trains of physical inquiry; and as an observatory rich in self-recording instruments. He invited, as one of the Kew committee, all members to go down to the observatory to witness the beautiful and accurate processes in operation, of which, without seeing, no adequate idea of the kind of work done at Kew could be formed. He then described the principle and construction of a self-recording instrument for magnetic registry.

Sir D. Brewster thought the method of multiplying the impressions of the tracings of the instrument subject to the error of the copyist; he preferred photographic negatives.

2. Prof. Powell's report, submitted by Prof. Stevelly, was in continuation of that for 1849. He had received contributions from many friends, but especially from Mr. Lowe and from Dr. Buist in India, he had also been enabled to procure notices of older observations. The same tabular arrangement, with slight improvements for the sake of clearness, had been followed. The report was very voluminous, and from the notices, Prof. Stevelly said, if selected, something of interest might be got, but he thought it better to leave them to be read in the next volume. Prof. Stevelly surely forgot, that scarcely a third of the attendants at a meeting ever see the volume; and moreover, that so passing over the report was not exactly just towards Prof. Powell, who has so industriously and perseveringly pursued the subject, and upon the publicity of his readiness to receive communications of luminous meteors, the success of his inquiry mainly depends.

3. The object of this paper is to investigate the relations which must exist between the elasticities of different kinds, possessed by a given solid substance, and between the different values of these elasticities in different directions.

The different kinds of elasticity possessed by a solid substance are distinguished into three; first, *longitudinal elasticity*, representing the forces called into play in a given direction by condensation or dilatation of the particles of the body in the same direction. Secondly, *lateral elasticity*, representing the force called into play in a given direction by condensation or dilatation of the particles of the body, in a direction at right angles to that of the force; and thirdly, *transverse elasticity*, or *rigidity*, being the force by which solid substances resist distortion or change of figure, and the property which distinguishes them from fluids. The author's researches refer chiefly to substances whose elasticity varies in different directions. His first endeavour was to determine the laws of elasticity of such substances, so far as they are independent of hypotheses respecting the constitution of matter; a method which has not hitherto been followed. The first proposition respecting such substances is the following:—

Theorem First.—In an elastic substance which is homogeneous and symmetrical with respect to molecular action, there are three directions at right angles to each other, in which a longitudinal strain (viz., dilatation or condensation) produces a pressure in its own direction.

These three directions are called axes of elasticity. They are the proper directions for the reduction of all molecular displacements and pressures. Their existence has been demonstrated according to various hypotheses as to the constitution of matter, but the truth of the demonstrations is independent of the particular hypothesis.

The elasticity of a body, referred to these three axes, is expressed by twelve coefficients, three of longitudinal and six of lateral elasticity, and three of rigidity, which are connected by the following laws:—

Theorem Second.—The coefficient of rigidity is the same for all directions of distortion in a given plane.

Theorem Third.—In each of the co-ordinate planes of elasticity, the coefficient of rigidity is equal to one-fourth part of the sum of the two coefficients of longitudinal elasticity, diminished by one-fourth part of the sum of the two coefficients of lateral elasticity in the same plane.

The investigation having now been carried as far as is possible without the aid of hypotheses, the author determines, in the first place, the consequences of the supposition of Bescovich, that elasticity arises entirely from the mutual action of atomic centres of force. The author denominates bodies so constituted *perfect solids*, and respecting them proves the following propositions:—

Theorem Fourth.—In each of the co-ordinate planes of elasticity of a perfect solid, the two coefficients of lateral elasticity, and the coefficient of rigidity, are all equal to each other.

Theorem Fifth.—For each axis of elasticity of a perfect solid, the coefficient of longitudinal elasticity is equal to three times the sum of the two coefficients of rigidity for the co-ordinate planes which pass through that axis, diminished by three times the coefficient of rigidity for the plane lateral to that axis.

Thus, in perfect solids, all the coefficients of elasticity are functions of *three* independent coefficients—those of rigidity. In no previous investigation has the number of independent coefficients been reduced below six.

To represent the phenomena of *imperfect* solids, there is introduced the *hypothesis of molecular vertices*, in addition to that of atomic centres; that is to say, each atomic centre is supposed to be surrounded by a fluid atmosphere, retained round the centre by attraction, and diffused from it by the centrifugal force of revolutions, constituting *heat*. The author has already applied this hypothesis to the theory of the elasticity of gases and vapours, in a paper read to the Royal Society of Edinburgh, and published in their Transactions, Vol. XX. Applied to solids, it leads to the following conclusion:—

Theorem Sixth.—In an imperfect solid, according to the hypothesis of molecular vertices, each of the coefficients of longitudinal and lateral elasticity is equal to the same function of the coefficients of rigidity which would be its value in a perfect solid, added to a coefficient of fluid elasticity which is the same in all directions.

Thus the number of independent coefficients is increased to four.

The rest of the paper is occupied by the deduction of some important consequences from these principles.

This paper is intended to form the foundation of the theoretical part of a series of researches on the strength of materials.

Sir D. Brewster read a letter from Mr. Walker, of Edmonstone, inviting members to inspect a tree there, which some time ago was struck by lightning. M. Martins, Sir David said, had observed a tree, struck by lightning, give out steam in large masses, enveloping the whole tree, which, from the height of six feet to fifteen feet was converted into strips like lucifer matches. It would be interesting if the same phenomenon had been produced at Edmonstone, and he proposed the formation of a committee to examine and report.

4. Dr. Scoresby had had, for many years, opportunities of observing the magnitude and velocity of waves, and more recently, in returning by the steamer Hibernia from Boston, in the spring of 1848. For such observations steam-ships present peculiar advantages. In scudding before the wind, the paddle-boxes on either side prevent the rolling of the vessel to any great extent, and the ship, when in the trough of the sea, is almost perfectly steady for several seconds together. There are also different platforms from which observations may be made from the deck, the saloon or cuddy deck, and the paddle-boxes. In the case of the Hibernia, on the occasion referred to, he had ascertained that the height of the eye on the saloon deck, above the line of flotation, was about twenty-three feet three inches, and on the paddle-boxes thirty feet three inches. On the 5th of March, 1848, lat. 51.28, lon. 30, it blew a hard gale at sunset, with the barometer at 29.50. Next morning, at ten o'clock, it stood at 28.30, when the scene was terribly magnificent. Looking from the saloon deck almost every wave was above the eye, and consequently more than twenty-four feet above the trough, or twelve above the mean level of the sea. He then ventured on to the paddle-box, and when the ship was completely within the trough of the sea, which even its great length could not span, at least half the waves rose above the paddle-boxes, and many, as determined from the angle of elevation (above 2½ deg. at a distance of 300 feet), about three feet higher, adding thirty feet for the level of the eye, the height of the average highest waves must have been forty-three feet above the level at which the ship floated. The appearance the ocean then presented was one of the grandest he had ever beheld. During the swell which continued after the storm, the waves were still of great height, but reduced, on the average, to about twenty-four feet. Whilst the mean elevation of the highest waves, from the hollow of the trough, was forty-three feet, occasional wave-crests were raised still higher. The general average of the time occupied by the waves in overtaking the ship was 16½ seconds. The length of the vessel was 220 feet, and the waves were six seconds in passing from stern to stem, thus giving (after variations for ship's progress and obliquity of course) the probable distance of the waves, from crest to crest, of 559 feet. In determining the mean velocity of the wave, reference must of course always be had to the velocity of the ship at the time. During the time which elapsed between successive waves overtaking the ship, the vessel, as was ascertained by her rate of sailing at the time, had advanced so much as to make the actual distance accomplished by the waves in 16½ seconds, 790.5 feet, so that their velocity was about 32.67 English miles per hour, or assuming the largest possible error, certainly thirty miles per hour.

Mr. Scott Russell observed that Dr. Scoresby's observations have thrown much light on this subject, and he bore testimony to the accuracy of Dr. Scoresby's mode of measuring the height, which is perhaps the most difficult point, and also the velocity of the waves. From smaller waves, only sixteen inches broad, Mr. S. Russell has predicted, in tables published some time ago in the Transactions of the Association, that waves 559 feet long will be found to have a velocity of from thirty to thirty-one miles per hour. And it must be gratifying to the lovers of science to learn that, until Dr. Scoresby came into the room this morning, he had never heard or seen anything of these tables. In such observations as those which had just been read, the three main points to be noted were—1st, The greatest height of the wave; 2nd, The distance from the top of one wave to the top of another; and 3rd, The period of oscillation of the wave.

5 and 6. Professor Stokes proposed an easy experiment, in lieu of Professor Airy's, for determining whether the difference between polarized light reflected from metallic surfaces and that from other surfaces depended upon acceleration or retardation; and pointed out, in regard to the fringes of interference, that if viewed with a prism of only a moderate angle, the displacement was so small that it might not be observed.

7. A mean result of a series of observations on the refractive indices of oil of spikenard, oil of lavender, &c.

Section B.—(*Chemistry, &c.*)

1. Dr. George Wilson, a few unpublished particulars concerning the late Dr. Black.
2. Dr. Daubeny, report on the influence of carbonic acid on the growth of ferns.
3. Professor Voelcker, on the per-centage of nitrogen as an index to the nutritive value of food.
4. Henry Taylor, Esq., on the chemical composition of the rocks of the coal formations.
5. H. C. Sorby, Esq., F.G.S., on the trimorphism of Carbon.
6. J. P. Gassiot, Esq., F.R.S., on a peculiar form produced in a diamond under the influence of the voltaic arc.
7. J. P. Joule, Esq., F.R.S., on some Amalgams.

2. Dr. Daubeny read his Report "On the Influence of Carbonic Acid on the Growth of Ferns." He referred to the theories on the subject, which his experiments on three different classes of ferns had tended to confirm. The effect, so far as he had yet seen, was certainly an addition to the luxuriance of the plants, bnt he hoped next year to communicate some definite results. Mr. Hunt mentioned that he had made similar experiments, and that the results were the same as those stated by the learned Professor.

3. Professor Voelcker read a paper "On the Per-Centage of Nitrogen as an Index to the Nutritive Value of Food." The nutritive value, as determined in this way, he believed to have been considerably overrated, and referred to certain experiments which he had made on fungi which were remarkable for the quantity of nitrogen they contained, and were understood to be highly nutritious. Inaccuracy is often occasioned by the presence of ammonial salts in the juices of plants, and every practical chemist, he said, would hesitate unless his deductions were corroborated by actual feeding experiments. — Dr. Christison thanked Professor Voelcker for his paper, and remarked that he had long suspected a fallacy in the method of determining the nutritive value of food as derived from the azote of nitrogen only.—Dr. Daubeny expressed the interest he felt in the subject of the paper, and remarked that he considered the presence of ammonia as the starting point from which all vegetable nutrition proceeds. — Dr. Thomson thought that there might be some risk of a one-sided view of this question. Nitrogenous ingredients form only one of the constituents; we must look to the whole. Without certain salts, as Liebig observes, it is impossible to form healthy blood, and without healthy blood nutrition is impossible.—Dr. Lyon

Playfair referred to Professor Voelcker's experiments, pointing out the error referred to as exceedingly important. It was lamentable to think how little was known as to the really nutritive qualities of different kinds of food—the nitrogenous or flesh-forming matter, the carbonic or heat-giving matter, &c.

4. Dr. ANDERSON gave an analysis of a paper by Henry Taylor, Esq., "On the chemical composition of the rocks of the Coal Formations," pointing out the analogies of constitution between certain rocks, and referring to Mr. Taylor's experiments on organic and inorganic constituents. The author had in view the solution of the difficult problems connected with geology, by facts deduced from chemistry; for instance, the deposition of the stratified rocks as to their order, &c., by a process of reasoning based on the composition of these rocks, and to this end he submitted several analyses as a small contribution to our knowledge of the rocks of the coal formation. Details of the analyses of fire-clay, specific gravity 2·519, good coal, specific gravity 1·259, coarse coal, specific gravity 1·269, bituminous shale, specific gravity 1·860, blue shale (slate-clay), specific gravity 2·536, micaceous sandstone, specific gravity 2·598, muscle bind, specific gravity 2·592, and of cannel coal, specific gravity 1·319, were given, and a comparative view of the analyses seemed to suggest a pretty close connexion between various members of the group, taken principally from "Buddle's Hartley" colliery in the Newcastle coal field. The organic matter intermixed with the various strata enclosing the coal appeared to be of the same composition as the coal itself, except that its decomposition had been carried further. The inorganic matter of these strata likewise evidence a close connexion among them, though owing to the greater number of constituents, this could not be so readily shown. Formulæ for the two classes of matter were given, and Mr. Taylor, in conclusion, hoped that the results of his analyses were sufficiently interesting to lead others into the same field of inquiry, and eventually to a right appreciation of the laws which regulate the deposition of the stratified rocks.

5. H. C. SORBY, Esq., read a paper "On the Trimorphism of Carbon," and exhibited diagrams of diamond, coke, and anthracite, as seen through the microscope. His object was to establish the fact, that coke was crystallized in structure when very hard, and in the same form as the diamond. He had obtained anthracite in the form of crystals.

6. J. P. GASSIOT, Esq., brought under the notice of the section "A peculiar form produced in a diamond under the influence of the Voltaic Arc." He exhibited to the section a diamond which had been exposed to the intense heat produced by the voltaic battery, when arranged as in the device for the electric light. The diamond had been fused, but instead of changing into coke, it had become a glassy mass, and seemed to consist of a multitude of small crystals adhering to each other. Mr. Gassiot had repeated the experiments of a French chemist, but had obtained different results.—Dr. Gregory adverted to the remarkable fact of their seeing before them another form of the diamond more like certain minerals in a fused state, such as felspar, and also white, which was not the case with any other species of carbon known.—Dr. Daubeny suggested the possibility of the change having arisen from the action of heat, independently of the fusion. The diamond was examined with great interest.

7. The last paper read was by J. P. JOULE, Esq., "On some Amalgams." The author, after describing the properties of the amalgam of iron, which he had succeeded in forming by depositing iron upon mercury by the electrotype process, proceeded to point out the method pursued by him for obtaining amalgams in a definite form. An amalgam containing excess of mercury was enveloped in a silk bag, and then exposed in a small press to a pressure of sixty tons per square inch of surface. In this way mercury, almost perfectly pure, was expelled, leaving an amalgam of definite chemical constitution.

SECTION C.—(*Geology and Physical Geography.*)

1. Mr. Ormerod, on the Gradual Subsidence of a portion of the Surface of Chat-Moss by Drainage.
2. Professor Edward Forbes, on the Succession of Beds, and the Distribution of Organic Remains in the Dorsetshire Purbecks.
3. Sir Roderick I. Murchison, on the Discovery of Carboniferous Fossils in the Crystalline Chain of the Forez, France, and on the Age of Lines of Dislocation.
4. Mr. Bryce, on the Lesmahagow and Douglas Coal-fields.

Sir RODERICK I. MURCHISON, on taking the chair, expressed himself proud of being a Scotchman, and gratified to find many of those friends around him who had been present at the last meeting in Edinburgh, now sixteen years ago.

1. The first communication was by Mr. ORMEROD on the Chat Moss, between Manchester and Liverpool, on the line of railway, and which, in consequence of part of it being drained is slowly undergoing a subsidence of the surface level to the extent of upwards of one inch annually.

3. Sir R. I. MURCHISON then gave a description of the crystalline rocks of the chain of the Forez in France, which have hitherto, from their external appearance, been ranked with the primary sedimentary rocks, but which he found contained fossils of the carboniferous era.

SECTION D.—(*Natural History, including Physiology.*)

1. Dr. Hugh Cleghorn, H.E.I.C.S., on the Hedge Plants of India, and the conditions which adapt them for special purposes and particular localities.
2. Sir J. G. Dalyell, Bart., on Exuviation, or the Changes of Integuments by Animals.
3. Professor Royle, F.R.S., notice of the Distribution of the Herbaria of the Honourable East India Company.
4. Mr. Hancock and Dr. Embleton, on the Anatomy of Doris, including the description of the true Sympathetic Nervous System in this Animal.
5. C. C. Babington, F.L.S., remarks on Anacharis Alsinastrum.
6. Dr. Macdonald, F.R.S.E., on the Vertebral Homologies of the Basicranium.

Ethnological Sub-Section.

1. Dr. Edward Hincks, on the Language and Mode of Writing of the Ancient Assyrians.
2. Professor Rangabe, of Athens, notices of some additions made to our knowledge of the Ancient Greeks by recent discoveries in Greece.
3. Daniel Wilson, Esq., inquiry into the evidence of the existence of Primitive Races in Scotland, prior to the Celtæ. *With Illustrative Crania, &c.*

SECTION F.—(*Statistics.*)

1. G. R. Porter, Esq., F.R.S., on some particulars of Self-Imposed Taxation.
2. Professor Hancock, on the cost of obtaining Patents in different countries.
3. Professor Hancock, on the causes of Distress at Skul[1] and Skibbereen, during the famine in Ireland.

SECTION G.—(*Mechanical Science.*)

1. Mr. Scott Russell read a report from Rio Janeiro, on the Progress of the Wave Principle as applied to the Construction of Ships in the Brazils.
2. Mr. Stokes read a communication on the Hyperbolic Law of the Elasticity of Cast Iron, by Homersham Cox, Esq.
3. Mr. Ruthven, on Improvements in Propelling Steam-Vessels.
4. Mr. Macpherson, on a Method of Preventing Water Pipes bursting with Frost.
5. Mr. James Nasmyth, on Improvements in Forging Iron.

On the Vertebral Homologies of the Basicranium and its Skeletal Appendages. By Professor Macdonald, M.D.

AFTER a short introduction, showing the importance of these investigations, and the necessity of using the same terms for homologous parts in the different classes of animals, which should be determined rather by anatomical than physiological characters, which is apt to mislead in homology, unless guided and guarded by sound anatomy, the professor adopted the terms of homology, homotype, and analogy, as proposed and explained by Professor Owen, and then showed that the basicranium was the repetition of the central portion of the vertebral column.

He restricted the archetype, or ideal vertebra, to the centrum and processes more immediately connected with it, avoiding a common but inconvenient system, which not only described as part of the vertebra, the perineural arches, the costal laminæ inclosing the viscera and forming the parietes of the different thoraces, but even the zones encircling these and supporting the membral laminæ. With this restriction, he then stated that in man the basicranium exhibited very distinctly the radiate type as seen in the asteria, in which its central or oral portion was represented in the sella turcica—the ray opposite the madrepore spot being the homologue of the anterior basicranium, formed (1) by the centrum of the spheno-ingrasial vertebra, (2) by that of the Ethmo-frontal, (3) by that of the nasal, while the other rays were the homologues of the extremities.

The Dr. then proceeded to show the importance of applying the same terms to homologous portions of the skeleton, as far as possible avoiding those previously applied in a different sense, although he reluctantly applied the term cephalo-thorax to that portion of the cranium formed by the costoid bones of the face, which meet in the sternoid palate. The entomologists had applied it in those cases where there was a blending of the thoracic with the cephalic segments; if this prior claim is enforced, the term mandibulo-thorax may be adopted.

The central, or vertebral portion of the anterior basicranium being formed by the sphenoid bone, the transverse processes, and the perineural arches, by the alæ majores completing the atloid portion of the sphenoid vertebra, while the axoid portion of this vertebra had the body and odontoid process formed by the olivary and sella turcica and its perineural arches, the alæ minores or ingrasial wings ending in the spinous process. These are in mammals spread out to support the greater development of the brain, but form a partial septum in the osseous fishes connecting the basicranium with the frontal roof, allowing the olfactory and optic columns to pass through. The sphenoid body in the osseous fishes (marked by Professor Owen as two bones, 5 and 9) is much longer than in man, where it terminates at the junction with the ethmoid, which is the body of the frontal vertebra. The atloid portion being formed by the crebriform plate of the ethmoid and the frontal, while the axoid consisted of a centrum, formed the superciliary prominence containing the frontal sinuses and the crista galli, as the odontoid, while the spine extended upwards in the course of the longitudinal sinus, between the two alæ frontalis; the septum, thus closed up, arrested the prolongation of the probascidan medullary column, which in the higher vertebrates was turned over the ganglia at the base of the brain, forming the cerebral or hemispheric lobes. From these vertebral centres the facial bones descended to form the cephalo-thorax, having its medastinum formed in man by the vomer resting on the upper surfaces of the hard palate, while the rostrum of the sphenoid was received into the socket formed by the two plates of the vomer. The Dr. exhibited a section of the cranium and spine of a young subject from the museum of Mr. Struthers, which very well showed the relations of this portion of the basicranium with the cephalo-thorax, and at the same time pointed out the error of considering in the osseous fishes the basicranial centrum as the vomer, as both Cuvier and Owen have done. The vomer only exists as a septum or mediastic ring when there is a nasal cavity; but as there is none in osseous fishes, the palatial plate of the incisive bone is articulated to the sphenoid body, which supports the olfactory column on its upper surface, having no crebriform plate to allow the olfactory nerves to pass through, as in mammals.

Notices of some additions made to our knowledge of the Ancient Greeks by recent discoveries in Greece. By Professor Rangabe, of Athens.

PROFESSOR RANGABE, read the following paper on

some additions made to the knowledge of ancient Greece by the recent discoveries in that country.

Coming from a country—said the learned gentleman—whose regeneration is but of recent date, and appearing before you as the representative of the Archæological Academy of Greece, a scientific institution of but a few years' standing, I feel that I ought rather to have maintained a reserved silence in presence of this meeting. Greece, it is true, powerfully aided by her King, a sincere friend to learning, has made rapid steps in the path of progress. But her efforts can as yet be but purely passive. In her thirst for knowledge, she is now striving to borrow back from the great seats of human learning a few of those rays by which she had herself formerly enlightened the universe: but she has not the presumption to attempt as yet to contribute anything herself. I cannot, however, in presence of a meeting in which the highest intellectual powers of Great Britain are represented, allow this opportunity entirely to pass without proclaiming loudly the ties of gratitude which attach the Greeks to the people of Great Britain, for the deep sympathy and powerful aid afforded to them in their long struggle for independence; and to affirm that my countrymen, making a just distinction between the sentiments of the nation and what is entirely foreign to it, have as yet allowed no circumstances to counterbalance in their hearts the remembrance of the hecatomb of British Philhellenists who mingled their blood on the fields of Platea and Thermopylæ with that of the heroes of antiquity.

There does exist, however, one subject, one alone, by which I may venture to say that Greece must excite to the highest degree the interest of the learned—namely, that of her ancient monuments, which can never cease to be an object of universal study and admiration; and I may, perhaps, all the more hope to be heard with indulgence, while I attempt to give a short account of the principal facts with which the science of archæology has been enriched by the discoveries made in Greece since her affranchisement, that it is to the learned investigations of British antiquarians in particular that is due most of the knowledge we already possess of the Hellenic monuments. Like those towns of Italy, which reappear in their ancient splendour when their covering of lava is removed, Greece, as soon as she had shaken off the slavery of so many centuries, offered to the admiration of the world the innumerable treasures of her antique beauty; and her monuments, after having seen so many barbarian conquerors pass over their ruins, and after having been so often exposed to destruction, and after—may not I, whose days are passed among the mutilated remains of the Parthenon, be permitted to say so?—the severe damage inflicted on them by the too fervid zeal of a distinguished amateur, became once more the objects of a renewed worship, as soon as her freedom had rendered Greece accessible to all, and an enlightened government, aided in its efforts by an archæological society, had restored them to light.

Among these mountains there are many which cannot fail to excite interest in the most indolent imagination. They are those which bring us back to times which we are accustomed to see through the prism of poetry, and which disclose to us at a period antecedent to history, a powerful civilisation, which we find indeed in the songs of Homer, but which we are rather disposed to look upon as an effort of the sublime imagination of that great genius of heroic time.

Before the emancipation of Greece, the traveller, gazing in wonder on the gigantic walls of Tyrinth and Mycenæ, was inclined to ask if their construction was not rightly attributed by fable to superhuman workmen; and, in order to complete the first page of Hellenic ethnography, illustrated by existing monuments, he was obliged to have recourse to the Tyrrhenian towns of Italy.

But the country of Agamemnon, now more easily traversed, and more carefully explored, is found to be covered with a great number of edifices belonging to the time of the *Anactes*. Captain Soitoux—one of the most indefatigable members of the French commission, which has rendered so great a service to science by their excellent map of Greece—saw in the wild ravines of Acarnania more than thirty foundations of towns, of Cyclopean construction. In Arcadia—the dwelling place of the Pelasgians, who pretended to have seen the creation of the moon, and who at least preceded the Hellenic race—polygonical walls are discovered every day; and in a valley unknown to travellers between the Lake Stymphalus and the Mount Trachys of Orchomenos, I had myself the happiness, two years ago, of discovering at the very spot where Pansanius (viii. 23) places it, the town of Halea, long sought for, and not as yet perceived by any of my predecessors. This ruin presents one of the most imposing examples of Pelasgic architecture, and at least two-thirds of it are in a state of rare preservation. Its form is that of a triangle, whose basis lay along the foot of the mountain, and whose two sides rise up on its flank. The latter only are standing, and they attain often a height of 5m., and contain 37 square towers. A parallelogram traced on the summit of the triangle, forms the acropolis of the fortress, whose walls are composed of gigantic polygonical blocks, and the lintel of whose doors consists of two inclined stones, which mutually support each other.

But in Argolis, the very seat of the power of the Atrides, the discoveries have not been few. At the same time with Halea, I saw in a little valley, separated from the Argolic plain by a rising ground, and quite close to Mycenæ, a square edifice till then unknown, of the finest polygonical style, each side being 11½m. in length, and rising in perfect preservation to the height of 3m., where its coping still exists. The interior was divided into three compartments, but the separations are almost entirely destroyed. This monument is one of the most interesting that has yet been discovered, as it discloses to us a particular branch of Homeric architecture. It is difficult to believe that at so short a distance from Mycenæ, an edifice belonging to the class of those which excited so highly the admiration of the ancients, should remain unnoticed by them; I am therefore tempted to suppose that this is no other than the tower of Polygnotus, as it was called, where Aratus, on his way from Argos to Phlius, had a meeting with his conspirators (Plut. Vit. Arat. 6 and 7).

The famous Temple of Juno at Argos, the scene of the pious exploit of Cleobis and Bion, was discovered after the deliverance of Greece. Under the ruins of a new temple, which had been built about the 90th Olympiad, and magnificently decorated by Polycleitus, is to be seen the gigantic foundation of the ancient sanctuary, which was burned about that same period by the negligence of the priestess Chrysis, and is now the only religious ruin, authentically proved, belonging to an epoch anterior to historical times.

I was present at the excavations made at Tyrinth by the illustrious German antiquarian, Thiersch, and I witnessed the highly interesting result which he obtained. On the western side of the hill of the Cyclops, he discovered a range of bases of columns; and this fact, combined with the column already known in the Treasury of the Antrides, and that of the basso-relievo of the lions at Mycenæ, tend to modify the ideas held until now on Pelasgic architecture, and to prove that the principle of the columns—of a primitive form, undoubtedly, but containing the germ of the diverse forms developed later by the Dorians and Ionians—was, if not an indispensable part, at least an ornament frequently employed in the buildings of Homeric times. Another discovery of the highest importance to the architecture and ethnological history of that remote period has just been made in the south of Eubea. Walpole had already seen and described (Travels, vol. i.) on the summit of Mount Ocha, an edifice of a peculiar form and of an archaic style. Its walls are composed of very large parallelogramical blocks, of unequal dimensions; and its roof consists of several layers of stones, which advance on each side towards the centre, jutting out considerably the one beyond the other, instead of forming a smooth surface as in the Treasury at Mycenæ. But from this specimen of architecture, curious as it was from its differing from the usual forms of ancient art, no conclusion could be drawn to further our knowledge of that art, because it only furnished one isolated example. But at Styra, the town famous for its quarries, situated at the northern foot of the same mountain, the discovery was made a few years ago, of three buildings of the same nature, one of which is peculiar for its roof being circular. On another peak of Mount Ocha, I myself visited, only last summer, several edifices, the evident remains of a very ancient town, suspended on the brink of an abyss equally inaccessible by sea or by land, and known only to the shepherds of those wild regions, who give it the name of *Archanpolis*, or ancient town. These buildings are constructed on the same architectural principles; and I have heard another position described not far from the Cavo d'Oro, as the Venetians called the Capharea, where more such ruins exist. It is very remarkable that all these constructions, which, though belonging to the general system of Pelasgic architecture, differ sufficiently from it to contribute a class apart, are all found grouped in so considerable a number on one point of Greece; and this circumstance leads one to presume, that this style belongs properly to some tribe, which, having its principal seat in the deep valleys of the Ocha, emanated, like all those which occupied in heroic times the soil of Greece, from the common stock of the Pelasgians, but which had a character sufficiently distinct from the other branches, to have developed the art of building in a particular sense. And in this race, in my opinion, we may recognise the *Dryopes*, who, in the most remote times, expelled from their ancient seats in Thessaly, came to occupy the southern part of Eubea, just the spot where these constructions of so ancient a style, and so distinct from all other examples offered to us by history, have been discovered.

But the discoveries made in Greece since her emancipation have not less served to rectify and to extend the notions already possessed on *Classical* Architecture. The Propylea having been disencumbered from the modern fortifications which concealed them from view, and having now reappeared in all their ancient harmony, it is easily recognised that their magnificence corresponded fully with that of the immortal monuments to which they gave access, and that their superb flight of steps occupied the whole width of the entrance to the Acropolis, descended probably to the Agora, and was ornamented on either side by terraces supporting statues and temples. One of the latter, the Temple of Victory without wings, the finest jewel of the Acropolis' crown of monuments—which had disappeared between 1676, when Spohn and Wheeler travelled in Greece, and 1751, when Stuart visited it—now discovered again under a Turkish bastion, and restored, offers to study one of the purest and most perfect examples of the tetrastylos amphiprostylos of the Ionic order which exists in the world. The mouldings of its entablature, as well as those of the Propylea and of the Parthenon, bear evident traces of painted ornaments, and put it beyond all doubt that the ornamental parts of the temples were painted in Greece, like those of Sicily, in the time of Pericles, as well as at more ancient periods, when they were often replaced by terracotta. In the Pinacothek, which contained the famous pictures of Protogenes, the walls which the French or Catalanian dukes had constructed to convert this part of the Propylea into their Chancery having been destroyed, the original partitions have been brought to light; and I think that the examination of these and of the walls of the Temple of Theseus, may give the solution of the question which has been the subject of

so much controversy, namely, whether the ancients painted exclusively on the walls or on panels of wood, by proving that the Pinacothek was covered with panels, or, rather, moveable pictures; whereas the paintings in the Temple of Theseus were executed on a stucco fixed to the wall itself. And I may here mention that one of the greatest connoisseurs of the painting of the ancients—M. Raoul-Rochette, of the Institute of France, is now occupied in putting together all the recent information obtained on this subject, with the intention of working it into a special treatise.

The Parthenon, in spite of the exact and conscientious work of Cockerell, when delivered of the barbaric ruins which insulted its grandeur, had still secrets to disclose; and it is well known that attentive observations have taught the astonished architects of modern times, that of all those lines whose magnificent harmony is the source of the inimitable beauty of this edifice, there is not one which is a straight line; that with a depth of science which would put to fault the calculations of the profoundest mathematician, the architect, imitating nature, who avoids a straight line in her organic productions, had composed a system of curves beyond the skill of modern art to combine or reproduce.

The Erechtheum, that enigma of architecture, can also be better understood since it has been raised from its ruins; and in my opinion it is now evident that this Temple was double, in spite of its having four names, and that the singular distribution of the house consecrated to Erechtheus which it replaced had been adopted in its construction. The new notions obtained on this Temple have been most ably discussed in the Annals of the Academy of Munich, by the most learned philologian of Germany, M. Thiersch, who is now preparing a second work on the same subject.

To the study of Sculpture the results have not been less important. Each fragment fallen from the chisel of a great master, and now withdrawn from the dust, is an inestimable treasure. The excavations made around the Parthenon have augmented our glyptic riches with twenty-one pieces of the frieze, one metope, and six large fragments of statues belonging to the front of the Temple, all master-pieces, which serve, in a slight degree, to console the Greeks for the painful losses made at a time when it was not in their power to prevent them. I may say as much for the blocks of the frieze of the Temple of Victory, which are the completion of those carried away by Lord Elgin. The discovery of the frieze of the Erechtheum is not a less precious one: its existence even was unknown, when twenty-one small statues of equal dimensions were found in the rubbish. They are of white marble, and having the back part of each quite flat, were evidently applied to and detached themselves from a black ground of Eleusis stone. The execution is of the purest style; and they allude, I think, to the procession of the Pandrosus, to the birth of Erichthonius, and to the loves of Mars and Mercury with Agraula and Herse.

I shall not enter into a detailed enumeration of all the invaluable pieces of Sculpture which have been gathered into the Museum of Greece. But there are several which have enriched antiquarian knowledge with entirely new facts. It is thus that a very remarkable bas-relief, found in a cemetery on the east coast of Attica, and representing a warrior larger than life, serves as a precious stepping-stone for the history of art among the ancients, by affording a very important specimen of the archaic school of Athens, and particularly of the manner of *Aristocles*, whose name is inscribed on it, and who, according to my idea, flourished about the 66th Olympiad. Having come from Sicyone, where his grandfather had established himself after leaving Crete, this artist may be considered as representing the connexion between the different schools of archaic art. This fine bas-relief also teaches us, that at the most remote period the same habit existed, which continued in later times, of painting works of sculpture, or at least the ornamental parts and accessories of them.

Among the Inscriptions recently discovered, and which serve to extend our archæological information, I shall only mention the most important to the history of Art, such as those which give us new details on the epoch and the works of divers sculptors. It is thus that by one of them we learn that *Eudaeos*, thought to be the pupil and relation of Dedalus, was, in fact, only a *Dedalides*, an artist of the archaic school, and not more ancient than Aristocles. We learn from another, the existence of a sculptor of the same epoch, named *Nesiotes:* and from a third, that it was *Strongylion* who executed the famous *Durian* horse on the Acropolis.

Among those which throw a stronger light on the public life of the ancients, I shall only mention one, which, consisting of more than 120 fragments, contains the list of the allied towns which paid tribute to Athens. The knowledge of these enriches ancient geography with a number of names unknown until now, and completing the political history of Athens, gives a more exact idea of its greatness. The tribute-money seems to be calculated for a month, and the list only to contain the tenth part, or the share belonging to the Temple. As far as the mutilated state of these fragments permits one to judge, that share seemed to have amounted to nearly five talents and a half a month. Several other inscriptions complete the lists already known of the treasures contained in the Parthenon, and the result to be obtained from them is, that in the days of the splendour of Athens, the Temple contained objects in silver and gold, weighing together about 17 talents of silver. From another of these inscriptions, we can calculate the rate of interest paid to the Parthenon when the funds of the Temple were lent to the town. I estimate this rate at 10 drachmas per 50 talents every day, or at 1¼ per cent. for a year. Other inscriptions not less precious, which have served as a basis to the learned work of M. Bœckh, throw a great and new light on the most powerful element of Athenian greatness, the organization and importance of their navy. The expense of the first expedition to Corcyra (Corfu), which opened the Peloponesian war, forms the subject of one of them; and I pass over in silence a great number of monuments illustrative of more than one important point of history, such as the political calendar of the Athenians; their relations with foreign princes and nations; the detailed organization of the Amphictionic league; the position of private slaves, and of the *hierodules*, or servants of the Temple; questions of topography and others relating to the public games.

I have only mentioned the discoveries the most rich in results, and the principal contributions which Greece has brought to the science of antiquity since her emancipation. And if it is true that my account is still far beneath the reality, and that a very abundant source of archæological knowledge, obstructed by the ruins under which centuries and barbarisms had buried it, has now been re-opened in Greece by the power of liberty, and by the enlightened efforts of a regular government, I hope I shall be allowed by the lovers of antiquity to advance, that the emancipation of Greece has not been a regretable event, as some seem to have wished to make it appear, and that Greece has by this return alone repaid the greater part of the sacrifices made in her favour.

MEETING OF THE GENERAL COMMITTEE.

The General Committee met in the afternoon for the purpose of fixing the time and place of the next meeting of the Association, and of electing the office-bearers for the next year. Sir David Brewster occupied the chair.

Mr. PHILLIPS stated that invitations had been received from the towns of Ipswich, Manchester, Belfast, Hull, and Liverpool. Deputations were heard from the various places (and from Leeds in addition), in support of their respective claims; but while all seemed equally anxious for the honour of the visit in 1852, it seemed to be the general opinion that the Association was, to a certain extent, pledged to visit Ipswich in 1851.

The Marquis of NORTHAMPTON, after enumerating the claims which Ipswich possessed to the visit of 1851, especially in being situated on the eastern coast, and in a part of England not hitherto visited by the Association, moved that the next meeting be held in that town.

Sir R. I. MURCHISON seconded the motion, which was unanimously agreed to.

On the motion of Dr. Robinson, the ex-President, George Airey, Esq., the Astronomer-Royal, was appointed President for the next year; and the following parties were appointed office-bearers:—

Vice-Presidents.—The Right Hon. Lord Rendlesham, the Bishop of Norwich, Rev. Professor Henslow, Rev. Professor Sedgwick, Sir John Brisbane, Bart., Sir William Middleton, Bart., J. G. Cobbold, Esq., M.P., and T. B. Western, Esq. Secretaries—G. Ransome, Esq., Charles May, Esq., C. D. Sims, Esq., and G. A. Biddell, Esq. Treasurer—J. B. Alexander, Esq.

Sir R. I. Murchison proposed that the meeting should be held some time in the month of June; but after some discussion (during which, however, a general opinion was expressed in favour of an early meeting), it was resolved to leave the precise period to the decision of the Council.

The Committee then adjourned till Wednesday.

At the last general meeting on Wednesday, at one o'clock, Sir R. Murchison, and afterwards Dr. Alison, took the chair. The last minutes were read, and the council and officials named for the ensuing year. After which the following grants and recommendations were agreed to, and the winding-up meeting of thanksgiving took place in the Music Hall, at three o'clock.

SYNOPSIS OF RECOMMENDATIONS.

Involving Grants of Money.

THE Establishment at Kew Observatory, 300*l.**

That Professor J. D. Forbes be requested to institute a Series of Experiments, for the purpose of testing the results of the Mathematical Theory of Heat; that Professor Kelland be requested to co-operate with him; and that 50*l.* be placed at the disposal of Professor Forbes for the purpose.

That the Committee for Superintending the Publication of the Tabular Forms in reference to Periodical Phenomena of Animals and Plants, be continued, with 5*l.* at their disposal.

That Professor E. Forbes and Mr. Bell be requested to continue their assistance to Dr. Thomas Williams in his Researches on the Annelida, with 10*l.* at their disposal.

That the Committee on the Vitality of Seeds be requested to continue their attention to that subject, with 11*l.* at their disposal.

That a Committee, consisting of Mr. R. Hunt, Dr. G. Wilson, and Dr. Gladstone, be requested to investigate the influence of the solar radiations on chemical combinations, electrical phenomena, and the vital powers of plants growing under different atmospheric conditions, with 50*l.* at their disposal.

That Dr. R. A. Smith, of Manchester, be requested to continue his investigation on the Air and Water of Towns, with 10*l.* at his disposal.

That, as the printed Queries formerly circulated for the purpose of obtaining Ethnological data are now out of print, a new and revised Edition of them be issued by Sir Charles Malcolm and Dr. Hodgkin, with 12*l.* at their disposal for the purpose.

Involving Application to Government or Public Institutions.

That a Committee, consisting of the President,

* The present acting committee to continue the superintendence at Kew, *pro tem.*

the Duke of Argyll, Sir R. I. Murchison, Professor James Forbes, and Lord Breadalbane, be appointed for the purpose of urging on Her Majesty's Government the completion of the Geographical Survey of Scotland, as recommended by the British Association, at their former meeting in Edinburgh, in 1834.

That Application be made to the Admiralty for the Publication of the Reports of their Committee on Metals.

* That a Committee be appointed by the Council, for the purpose of waiting upon Her Majesty's Government, to request that some means be taken to ensure to the Science of Natural History a more complete representation in the Trusteeship of the British Museum.

That the Council of the Association be requested to communicate with the Council of the Royal Society, and also with the Government, if necessary, respecting the possibility of relieving the Association from the expense of maintaining the establishment at Kew.

* That Her Majesty's Government be requested to institute a Statistical Survey relative to the Extent and Prevalence of Infantile Idiocy, as a measure greatly conducive to the public welfare.

Rules.

That the subject of Geography be separated from Geology, and combined with Ethnology, to constitute a separate section, under the title of the Geographical and Ethnological Section.

* That in future no Section shall omit to meet on account of Excursions, unless specially so determined in each case by the Sectional Committee.

Reports requested.

Professor Stokes.—On the General Theory of Vibratory Motions in Elastic Media.

Professor Willis.—On Acoustics.

Mr. G. Buchanan.—On the Strength of Materials.

Mr. Thomas Stevenson.—On the various modes of constructing Sea Walls, and the actual state of knowledge as to their power of resisting the forces to which they are exposed.

Mr. J. Whitworth.—On his Experiments for the purpose of constructing Accurate Standards of Measure.

Dr. Hugh Cleghorn, Professor Royle, Messrs. R. Baird Smith, and R. Strachey, H.E.I.C.S.—On the probable effects, in an economical and physical point of view, of the Destruction of Tropical Forests.

Researches, &c.

That the Committee on the influence of Carbonic Acid on the Growth of Ferns be requested to continue their investigations.

* That Dr. Percy and Professor Miller be requested to continue their researches on Crystalline Slags.

* That the Committee on Shooting Stars and Auroral Phenomena be reappointed.

* That the Committee on the Instrumental Measurement of Earthquake waves be appointed.

Miscellaneous.

That two Botanical Works, presented by Professor Parlatore, be deposited in the Library of the University of Edinburgh.

That the Committee of Members of Legislature, who are also Members of the British Association, who were requested to watch over the interests of science, and to inspect the various measures which might from time to time be introduced into Parliament, likely to affect such interests—be reappointed, and that the farther steps to be taken in this matter be referred to the Council.

* That the Tables of the distribution (in depth) of Marine Animals, by Mr. M'Andrew, be printed in extenso in the Volume of Reports of this Meeting of the Association.

* That the Presidents of Sections be requested, with such assistance from the Members as they may find desirable, to revise the recommendations which have from time to time been adopted in reference to Mathematical and Physical Science, and to communicate thereon with the Assistant General Secretary previous to the next meeting.

* A notice of motion, for next year, was given, that the sum now paid for Life Composition and Book Subscription (viz. £10) be divided into two sums of £5 each, the former sum being a necessary payment by all who compound for Annual Subscription; the latter an optional payment as a special Book Subscription.

A paper by General Briggs was ordered to be published at full length.

ORIGINAL CORRESPONDENCE.

HORÆ CELTICÆ.—NO. XIII.†

SIR,—It has often been considered a strange thing that the name of the Divine being should enter into the composition of the names of heathen and ungodly characters, as is generally thought to be the case in several proper names mentioned in the Sacred Scriptures. This general opinion, however, I conceive to be founded in mistake, for the termination *el* in Hebrew names, which is thought to denote the name of God, may be referred to a very different order of words. In fact, it seems to be a mere termination of adjectives, analogous to what is to be found in Latin and Celtic; and if this idea be correct, it would show how intimate is the connexion that exists between the Semitic and Celtic dialects, not merely in possessing cognate roots, but even in the manner of combining them.

One common mode of forming adjectives in Irish is by adding the termination ꞃaṁail, like, to substantives; thus, from ḟear, a man, is formed, by such an addition, ḟearaṁail, manlike, or manly. Now, with respect to this adjectival postfix, O'Donovan, in his Grammar (page 335), makes the following remarks:—

"This termination is written ꞃaṁail by some, and is generally pronounced as if written úil, and in the Erse as if *ail* or *eil*. It is analogous to the Latin (termination of adjectives in) *al-is*."

From the Erse pronunciation of this termination, the transition to the Hebrew *el* is not difficult; and supposing the Hebrews to have formed adjectives on this principle, we find thereby a much more appropriate explanation of many proper names than is afforded by the commonly received principle. Thus, for example, the name Ariel, instead of signifying "Lion of God," would signify lionlike, "cœur de lion;" and, in fact, in our English version of the Bible, lionlike is the translation give to this word in 2 Samuel, chap. xxiii. ver. 20, where it is said of Benaiah that "he slew two lionlike men of Moab," and "lions of God" is given in the margin.

In like manner may be explained many other names, such as Uriel, Abdiel, Othniel, &c., in which the substantive root appears to be Semitic; and the adjective termination takes the shortened form *el;* but perhaps the more lengthened form may be traced in other names; as, for instance, חנמאל, which may be compared with the Celtic ceanaṁail, gentle, mild; as also in the noun כרמיל, name of a colour, crimson, or perhaps scarlet, from Caoṁaṁail, flamelike.

Other modes of forming adjectives consist in adding the terminations ṁar and ac to substantives, and I think that both these modes may be traced in Hebrew names, the latter in such words as end in *ah*, as Uriah, and the former in such names as Ithamar. This name is written in Hebrew איתמר, and the interpretation given of it in Gesenius' Lexicon is "land of palms"—rather an absurd title for a man, one of the sons of Aaron. But in Irish, aiṫṁar, consisting of precisely the same letters as the Hebrew word, is an adjective, and may signify either eloquent or cheerful. If the former be chosen, it would be appropriate to a son of him, of whom it was said, "I know that he can speak well."

Leaving now this very fruitful source of interpretation of Hebrew names, I proceed to trace the derivation of a few words which have not hitherto been satisfactorily explained. And the first I shall select is *Teraphim*, the name given by Laban to the images which Rachel stole, and which are generally supposed to have denoted *Penates*, or *household gods*. The Hebrew word is תרפים, or *trephim*, and may be derived from the Welsh-Celtic root *tref*, a house or dwelling. In Irish, this word is ṫṫeaḃ, and by adding to it ḃé, god, we get the form ṫṫeaḃḃé, house-god; and hence, with the Hebrew plural termination *im*, *teraphim*. We may observe here, that in combining ḃé with another word, the initial letter of ḃé, being aspirated, loses its proper sound. As in the compound form still found in Irish lexicons—viz., ṫṫoiṁḋé, tutelary gods, the *Teraphim* of Laban are called in the Irish book leaḃar ḃṁeaċ, by the name laiṁḋia, which literally signifies hand-god—*i. e.*, images which could be carried in the hand; and perhaps the Latin word *lamiæ* is radically the same as this Irish one. By a combination of the same word ḃé with lar, a floor, or clár, a table, we get the root of the Latin word *lares*, denoting a sort of inferior deities presiding over houses and families; and so the literal meaning would be either floor-gods, from laiṁḋe, or table-gods, from claiṁḋe; in the latter case the initial guttural being omitted for euphony sake.

The next word we shall select for explanation is *azazel*, used in reference to the scapegoat, and which is considered by Hengstenberg to denote Satan; such also being the opinion of many of the Jews. If such be a correct view of the word, a derivation in confirmation of it may be deduced from Celtic; thus, the Hebrew form of the word is עזאזל, in which the first letter is one that frequently represented *o*, so that it might be read *ozazel*. Now, in Irish, or, over, is often prefixed to words to increase their signification, as ṫṫeiḋeaṁ, belief, and orṫṫeiḋeaṁ, over-belief, superstition; ṗonar, a mantle, oiṫṗonar, a taberd, an over-mantle. And prefixing this same little word or to ċṫeal, Satan, we get oiṫṙéiṫeal, *oshisel*, the *archfiend*, or prince of the devils, same as Beelzebub. Perhaps the word *Belial* denotes the same thing, being written more according to the pronunciation than Beelzebub; for in Irish, Baal, ḃíaḃal, pronounced *Bailial*, would signify the Baal, or Lord of the devils.

The last word which I shall on this occasion endeavour to interpret, is a comparatively modern word, which at first sigat might seem wholly unconnected with Celtic; but which, I think, will appear indubitably to belong to that extensive family of languages. I mean the name of the northern country called *Kamschatka*, and which is spelled in a variety of ways by various writers. In the *National Cyclopædia*, it is written "Kamtchatka," and this form we will take to found our explanation on. Now in Irish, the *northern* constellation, called the Seven Stars, or Charles' Wain, is known by the name of—what? Why of Camṙeaċċa, Kamtchatka, the crooked ploughshare; and it is still commonly called the Plough by us. Hence, from denoting the northern constellation, like the Latin word *septemtrio*, it came to signify the north, and thence, a northern country like Kamtchatka. Here, then, we have the name of a region on the north-eastern coast of Asia, which is purely and literally Irish, a fact which may well convince us of "the Eastern origin of the Celtic nations, and which is in itself truly surprising and extraordinary.

ALEPH.

* The Recommendations marked with the asterisk were presented for consideration, Wednesday, August 7.

† We have had so long an interruption of this philological series, that we are almost afraid to promise our readers beyond the day and the hour. We trust, however, to have a continuation, and in the meantime would refer to our last year's volume for its original Celtic and Egyptian inquiries into these interesting antiquities of language.—ED. L. G.

TO THE EDITOR OF THE LITERARY GAZETTE.

DEAR MR. EDITOR,—From the retirement of my ancestral hall I cannot forbear sending you a few remarks, in the hope that they may be found not unworthy a little space in your world-enlightening columns. When we regard the estimation in which the various branches of science are popularly held, a reflective mind cannot but be struck with the fact that this esteem is due, not so much to their intrinsic value and the actual state of relative perfection which they have at present attained, but rather to the long standing they have held in the world. Thus, in astronomy, every child would be ashamed to be ignorant of the facts that there are more worlds than one, that some of them actually revolve around the sun, and no man out of the Celestial empire maintains that an eclipse of the moon is, Chus-like, caused by the devouring jaws of a dragon. In chemistry most men have renounced all faith in alchymy and the philosopher's stone, saving, perhaps, Dr. Isaac Greene, of Edinburgh, who, it is well known, attempted to establish a bottle-glass manufactory from the carbonaceous waste of coalpits—called in Scotland coal-coom. Even the poetical Chaser, author of that beautiful work "The Music of the Spheres," refuses to believe in such a consummation, and, with the exception of Mr. Roger Roomes, who wrote "The Tit-bits of the Universe," there is probably no living man willing fully to stomach its possibility. And here, before proceeding further with the main object of my letter, I may, as a warning to the credulous, mention one of the circumstances on which Dr. Greene still strongly founds his belief that the transmutation of coal-dust into bottle-glass has a foundation in veritable experiment, and (sneer as they may) that the rest of the chemical world is miserably in error. You will recollect, when the subject was in everybody's mouth, it was arranged that he should, in concert with Sir Samson Abel, of Cork (then Dr. Abel), repeat his experiments, and I, as a mutual friend, was invited to be present. One day, while the chemists were busy in the anteroom making calculations and eating oysters, I chanced to enter the laboratory, and, as ill-luck would have it, I upset and broke the filtering apparatus, spilling its murky contents on the table. I was in despair; but hastily with a feather sweeping the semi-liquid substance into a glass bottle, (the first vessel that came to hand,) I thrust therein the filter paper, and gathering up the *débris*, put the fragments in my pocket and joined the chemists by another door. By and by we returned to the laboratory. They gazed on the change for some moments in silence. Dr. Greene first broke it. "Look!" cried he in an ecstasy; "is there any man here present, whose soul is so utterly devoid of the heaven-born attribute of Faith, that he refuses the eye-testimony of corporal humanity; *veni, vidi, vici;* and the sooty carbon of the filter hath of itself, in our absence, passed into a state of embottlement. Behold it yet encircleth the filter tissue, and the residue of the residuum, quantitatively diminished, qualitatively identical; and thus, clear as the noonday sun, resplendent in the vaulted Empyrean, shines cloudless the far-penetrating light of transmutation, erst dimly visible to the searching intellects of the alchymists of old." I said nothing; but Dr. Abel, with a long-drawn whew, turned rapidly round on his heel and thrust his hands to the bottom of his pockets. They parted with mutual distrust. The controversy till this date may perhaps still be considered undecided; for while the chemists merely smile and shake their heads, or cry pish! when the subject is broached; on the other hand, it is very well known that the distinguished historian Berwick, old Lord Clanjamfrey of the "outer court," and the great Scotch divine, Dr. Boanerges, were all perfectly satisfied with the experiments. Nay, even now Saxby of Queen's merit, quite gives him up. But I have wandered far from my subject.

When I was a student at Peter's Hall, I used to attend Dr. Roeland's lectures on Petrology, at first, I allow, principally "for the lark;" for it was a marvellous sight to see that truly eminent man, now elbow-deep in coprolites, now brandishing the pelvis of an elephant, and ever and anon his gown streaming behind him, flying across desks and forms to illustrate his eloquent discourse by the diagrams suspended on the walls. I thus became interested in the science of Petrology, and in after-life devoted most of my time to it, having, indeed, made a little noise in my day, as every one knows who is conversant with my papers in the *Petrological Journal*, amongst which not the least remarkable are, "Some account of the Blue Sand of the Isle of Dogs"—"Remarks on the Toadstones of the Spermian System of Central Tartary"—"On the Metamorphic Origin of the Lower Celtiberian Series,"* and "Illustrations of the Fossil Bones (sheepshanks) found in the Swiss Rocks called *'Roches Moutonniers.'*" Now, to say nothing of these humble efforts, is it not surprising, in a country that can boast of the labours of a Hutton and a Smith, and which in later times has been enlightened by the writings of Dr. Roeland, Professor Rushton, Sir Thomas Norman, Sir Alaster M'Murich, Sir Hugh Llywel, the Welshman, and many others too numerous to name; I say, is it not surprising that, in the year of grace 1849, the mass of English society is as ignorant of the grand generalities of Petrology as the Italian public was of the satellites of Jupiter in the days of Galileo. They still (though, for fifty years, proof has been heaped upon proof) look upon the doctrines of Petrology as wild speculations, when heaven (and Sir John Herschel) knows that its great leading principles are as securely based as the long-established principles of Astronomy. Nay, many weak but well meaning souls are not ashamed to raise the old cry of "heterodoxy." What, then? Was it unorthodox to believe in the satellites of Jupiter? Assuredly it was; but somehow, Popes have changed their opinions since the days of Galileo. There are other Popes besides the *ci-devant* Pope of Rome. Take a case in point, of the extent of popular ignorance. In the course of my reading, I lately observed the following anecdote in one of our popular journals. It relates to the closely allied and sister science of Geology, which is, in fact, a branch of Petrology.

Bishop Watson Geologizing near Kendal.—After the Bishop's marriage into the Dallam Tower family, he was a constant visitor there, especially during the University long vacation. Whilst there, he used to ramble about the hills and dales with a hammer in his pocket, as the Sedgwicks and Bucklands do now-a-days, chipping any little pebble he stumbled over. In one of these rambles it chanced that he got to the top of Helm Crag, not many miles from Kendal, and picked up a substance which he at once pronounced to be thrown from Ætna or Vesuvius, or some volcanic crater. On his way home he came naturally enough to the conclusion that Helm Crag itself was an extinct volcano. At the dinner table he produced this piece of lava as proof conclusive of his amazing discovery. The authority of a professor fresh from his laboratory, and still fresher from the University of Cambridge, could not be gainsayed—the gentlemen too well bred—the ladies too gallant to attempt it. There was one man, however, within hearing, on whom all this excited but a smile—the old family butler. Of course he said nothing then, and Watson's discovery was all in all; but, on the following morning, finding the Doctor in the library poring over the lava and taking notes, thinking probably that the honours of Dallam Tower were now at stake, and, with the privileges of his order, he administered to him this salutary information:—"Dr. Watson, excuse me, but I thought I heard you say at the table yesterday that Helm Crag was an extinct volcano. I don't know what an extinct volcano is, as I never saw one; but I do know that, when I was a lad, my father and I had a blast furnace on Helm Crag, and that's a piece of the cinder from the very spot." Facts are stubborn things: the Doctor looked aghast over his spectacles, put up his note-book, and with a gold guinea silenced, at least until the Doctor's departure, the discovery of the Doctor's ignorance.—*The Worthies of Westmoreland.*

Now, observe the easy-going ignorance in which those chippers of pebbles, "the Sedgwicks and Bucklands" are spoken of,—those world-renowned men, who have aided in building up a science, second alone, says Sir John Herschel, in the grandeur of its objects to the stately structures of Astronomy. Is it not as foolish as if one were to write thus: "When Doctor Robert Hook was on a visit to Professor Phlebottom, of Cambridge, whither he had gone to instruct Sir Isaac Newton in the law of gravitation, he was in the habit, during his leisure hours, of amusing himself with the extraction of air from quart bottles, an occupation which, simple as it may seem, has, in later times, and by other hands, resulted in the discovery of the air pump. One day at the dinner table, fresh from his bottles, and full of his subject, he announced the important fact that he believed himself to be on the threshold of a discovery which, dependent on the principle that suction might produce vacuity, or, in other words, a vacuum would shortly enable the very children to instruct their grandmothers in the mystery of the extraction of the internal viscidities of eggs. The learned men present were not more delighted than astonished at the profoundness of the speculation, but a quiet smile played round the calm features of Sir Isaac, who was observed to say a word or two to his man Gip, then waiting behind his chair. That original merely winked, respect for the company preventing his indulging in any remark. When the Doctor retired for the evening, Gip followed him up stairs with a plate of eggs, and, being a privileged person, and much indulged by Sir Isaac, he delivered himself to the following effect:—"I don't know, Doctor, what a vacuum is, for I never saw one, but only look here!" Whereupon, piercing each end of an egg with a woman's bodkin, he applied it to his mouth, then lengthening his jaws, he "with his mouth sucked in the air, in such a manner as when one eats oysters in the shell," after the fashion of Panurge when, before the Doctors in the Sorbonne, he, by signs, disputed with Thamaust, the Englishman, ending with a plop, as he withdrew the shell from his lips. This done, he placed the egg on the palm of his left hand, and, suddenly striking it with his right clenched fist, showed the philosopher that it was empty. The Doctor stood aghast with amazement, and with a gold Carolus or two stopped his mouth, at all events till he had time to beat a precipitate retreat from Cambridge.

I fear, Sir, I have already intruded too much on your valuable space, and will therefore, with your permission, reserve the prosecution of this subject for a future opportunity, should you deem my remarks worthy a place in your columns.

Coklehall, Gosolington. X. Q. Q.

* The metamorphic nature of the Lower Celtiberians is sufficiently proved by the fact that, in my time, they have already undergone many remarkable changes. First, when M'Murich's great and valuable work, the "Celtiberian Series," was concluded, he fairly abandoned them to Professor Rushton, who long before had denominated these rocks the Cymrugeiddion Strata. Then came Sir Thomas Norman with his staff (among whom at that time were Professor Philpots and young Sheepseye, now of Stinkomalee), and changed them into Lower Celtiberian. Then Sir Alaster published a letter to Sir William Orange, treating of the Fossiliferous Rubrician Deposits of Oatsdyke, in which he showed, besides, that, though he had said nothing of it, the arrangement of Sir Thomas and his walking staff was not new to him. After that came Mr. Blunt with a map like a waistcoat pattern, inextricably mingling all the subdivisions together, which, however ingenious, was somehow very soon forgotten.

Mesmerism.—The authorities in Paris have prosecuted one of the prescribing ecstatists, and fined her German doctor, for obtaining money under false pretences. A similar summary visitation upon some of the pretending quacks of London would not come amiss.

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Enfield, Romford	20 0	12 0	7 10	16 0	9 10	6 0
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Cheshunt	22 0	13 0	8 10	18 0	10 10	7 10
Broxbourne, Brentwood	25 0	15 0	9 0	20 0	12 0	8 0
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